grass valley

KAHUNA

9600 6400 PRODUCTION SWITCHER

User Manual

www.grassvalley.com

FCC Compliance

In order to comply with FCC/CFR47: Part 15 regulations, it is necessary to use high-quality, triple-screened Media or Monitor cable assemblies with integrated ferrite suppression at both ends.

Patent Information

This product may be protected by one or more patents.

For further information, please visit: www.grassvalley.com/patents/

Copyright and Trademark Notice

Terms and Conditions

Title	Kahuna User Manual
Part Number	13-06514-020
Revision	2021-02-23, 12:00

Important Safety Information

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

Symbols and Their Meanings

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that the user, operator or service technician should refer to the product manuals for important operating, maintenance, or service instructions.

This is a prompt to note the fuse rating when replacing fuses. The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.

Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

Indicates that static sensitive components are present, which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Indicates that the equipment has more than one power supply cord, and that all power supply cords must be disconnected before servicing to avoid electric shock.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Canadian Standard Association (CSA) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Intertek Testing Services regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley product means that it complies with all applicable European Union (CE) directives.

The presence of this symbol in or on Grass Valley product means that it complies with safety of laser product applicable standards.

Warnings

A warning indicates a possible hazard to personnel, which may cause injury or death. Observe the following general warnings when using or working on this equipment:

•Appropriately listed/certified mains supply power cords must be used for the connection of the equipment to the rated mains voltage.

• This product relies on the building's installation for short-circuit (over-current) protection. Ensure that a fuse or circuit breaker for the rated mains voltage is used on the phase conductors.

• Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only.

• Do not operate the equipment in wet or damp conditions.

• This equipment is grounded through the grounding conductor of the power cords. To avoid electrical shock, plug the power cords into a properly wired receptacle before connecting the equipment inputs or outputs.

• Route power cords and other cables so they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

• Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.

• Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.

• High leakage current may be present. Earth connection of product is essential before connecting power.

• Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.

• To avoid fire hazard, use only the fuse type and rating specified in the service instructions for this product, or on the equipment.

• To avoid explosion, do not operate this equipment in an explosive atmosphere.

• Use proper lift points. Do not use door latches to lift or move equipment.

• Avoid mechanical hazards. Allow all rotating devices to come to a stop before servicing.

• Have qualified service personnel perform safety checks after any service.

Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

• This equipment is meant to be installed in a restricted access location.

• When installing this equipment, do not attach the power cord to building surfaces.

• Products that have no on/off switch, and use an external power supply must be installed in proximity to a main power outlet that is easily accessible.

• Use the correct voltage setting. If this product lacks auto-ranging power supplies, before applying power ensure that each power supply is set to match the power source.

• Provide proper ventilation. To prevent product overheating, provide equipment ventilation in accordance with the installation instructions.

- Do not operate with suspected equipment failure. If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.
- To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.
- This unit may have more than one power supply cord. Disconnect all power supply cords before servicing to avoid electric shock.
- Follow static precautions at all times when handling this equipment. Servicing should be done in a static-free environment.
- To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

Electrostatic Discharge (ESD) Protection

Electrostatic discharge occurs when electronic components are improperly handled and can result in intermittent failure or complete damage adversely affecting an electrical circuit. When you remove and replace any card from a frame always follow ESD-prevention procedures:

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.
- When temporarily storing a card make sure it is placed in an ESD bag.
- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Battery Handling

This product may include a backup battery. There is a danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Before disposing of your Grass Valley equipment, please review the *Disposal and Recycling Information* at:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Cautions for LCD and TFT Displays

Excessive usage may harm your vision. Rest for 10 minutes for every 30 minutes of usage.

If the LCD or TFT glass is broken, handle glass fragments with care when disposing of them. If any fluid leaks out of a damaged glass cell, be careful not to get the liquid crystal fluid in your mouth or skin. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all times.

Mesures de sécurité et avis importants

La présente section fournit des consignes de sécurité importantes pour les opérateurs et le personnel de service. Des avertissements ou mises en garde spécifiques figurent dans le manuel, dans les sections où ils s'appliquent. Prenez le temps de bien lire les consignes et assurez-vous de les respecter, en particulier celles qui sont destinées à prévenir les décharges électriques ou les blessures.

Signification des symboles utilisés

Signale la présence d'une tension élevée et dangereuse dans le boîtier de l'équipement ; cette tension peut être suffisante pour constituer un risque de décharge électrique.

Avertit l'utilisateur, l'opérateur ou le technicien de maintenance que des instructions importantes relatives à l'utilisation et à l'entretien se trouvent dans la documentation accompagnant l'équipement.

Invite l'utilisateur, l'opérateur ou le technicien de maintenance à prendre note du calibre du fusible lors du remplacement de ce dernier. Le fusible auquel il est fait référence dans le texte doit être remplacé par un fusible du même calibre.

Identifie une borne de mise à la terre de protection. Il faut relier cette borne à la terre avant d'effectuer toute autre connexion à l'équipement.

Identifie une borne de mise à la terre externe qui peut être connectée en tant que borne de mise à la terre supplémentaire.

Signale la présence de composants sensibles à l'électricité statique et qui sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

Le symbole ci-contre signifie que l'appareil comporte plus d'un cordon d'alimentation et qu'il faut débrancher tous les cordons d'alimentation avant toute opération d'entretien, afin de prévenir les chocs électriques.

La marque UL certifie que l'appareil visé a été testé par Underwriters Laboratory (UL) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque C-CSA-US certifie que l'appareil visé a été testé par l'Association canadienne de normalisation (CSA) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque C-UL-US certifie que l'appareil visé a été testé par Underwriters Laboratory (UL) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque ETL Listed d'Intertek pour le marché Nord-Américain certifie que l'appareil visé a été testé par Intertek et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

Le marquage CE indique que l'appareil visé est conforme aux exigences essentielles des directives applicables de l'Union européenne en matière de sécurité électrique, de compatibilité électromagnétique et de conformité environnementale.

Le symbole ci-contre sur un appareil Grass Valley ou à l'intérieur de l'appareil indique qu'il est conforme aux normes applicables en matière de sécurité laser.

Avertissements

Les avertissements signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire fatales. Veuillez vous familiariser avec les avertissements d'ordre général ci-dessous :

- Un cordon d'alimentation dûment homologué doit être utilisé pour connecter l'appareil à une tension de secteur de 120 V CA ou 240 V CA.

- La protection de ce produit contre les courts-circuits (surintensités) dépend de l'installation électrique du bâtiment. Assurez-vous qu'un fusible ou un disjoncteur pour 120 V CA ou 240 V CA est utilisé sur les conducteurs de phase.

- Dans le présent manuel, toutes les instructions qui nécessitent d'ouvrir le couvercle de l'équipement sont destinées exclusivement au personnel technique qualifié.

- N'utilisez pas cet appareil dans un environnement humide.

- Cet équipement est mis à la terre par le conducteur de mise à la terre des cordons d'alimentation. Pour éviter les chocs électriques, branchez les cordons d'alimentation sur une prise correctement câblée avant de brancher les entrées et sorties de l'équipement.

- Acheminez les cordons d'alimentation et autres câbles de façon à ce qu'ils ne risquent pas d'être endommagés. Supportez correctement les enroulements de câbles afin de ne pas endommager les connecteurs.

- Coupez l'alimentation avant de nettoyer l'équipement. Ne pas utiliser de nettoyants liquides ou en aérosol. Utilisez uniquement un chiffon humide.

- Des tensions dangereuses peuvent exister en plusieurs points dans cet équipement. Pour éviter toute blessure, ne touchez pas aux connexions ou aux composants exposés lorsque l'appareil est sous tension.

- Avant de procéder à toute opération d'entretien ou de dépannage, enlevez tous vos bijoux (notamment vos bagues, votre montre et autres objets métalliques).

- Pour éviter tout risque d'incendie, utilisez uniquement les fusibles du type et du calibre indiqués sur l'équipement ou dans la documentation qui l'accompagne.

- Ne pas utiliser cet appareil dans une atmosphère explosive.

- Présence possible de courants de fuite. Un raccordement à la masse est indispensable avant la mise sous tension.

- Après tout travail d'entretien ou de réparation, faites effectuer des contrôles de sécurité par le personnel technique qualifié.

Mises en garde

Les mises en garde signalent des conditions ou des pratiques susceptibles d'endommager l'équipement. Veuillez vous familiariser avec les mises en garde ci-dessous :

- L'appareil est conçu pour être installé dans un endroit à accès restreint.

- Au moment d'installer l'équipement, ne fixez pas les cordons d'alimentation aux surfaces intérieures de l'édifice.

- Les produits qui n'ont pas d'interrupteur marche-arrêt et qui disposent d'une source d'alimentation externe doivent être installés à proximité d'une prise de courant facile d'accès.
- Si l'équipement n'est pas pourvu d'un modules d'alimentation auto-adaptables, vérifiez la configuration de chacun des modules d'alimentation avant de les mettre sous tension.
- Assurez une ventilation adéquate. Pour éviter toute surchauffe du produit, assurez une ventilation de l'équipement conformément aux instructions d'installation.
- N'utilisez pas l'équipement si vous suspectez un dysfonctionnement du produit. Faites-le inspecter par un technicien qualifié.
- Pour réduire le risque de choc électrique, n'effectuez pas de réparations autres que celles qui sont décrites dans le présent manuel, sauf si vous êtes qualifié pour le faire. Confiez les réparations à un technicien qualifié. La maintenance doit se réaliser dans un milieu libre d'électricité statique.
- L'appareil peut comporter plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher tous les cordons d'alimentation avant toute opération d'entretien.
- Veillez à toujours prendre les mesures de protection antistatique appropriées quand vous manipulez l'équipement.
- Pour réduire le risque de choc électrique, branchez chaque cordon d'alimentation dans des circuits de dérivation distincts utilisant des zones de service distinctes.

Protection contre les décharges électrostatiques (DES)

Une décharge électrostatique peut se produire lorsque des composants électroniques ne sont pas manipulés de manière adéquate, ce qui peut entraîner des défaillances intermittentes ou endommager irrémédiablement un circuit électrique. Au moment de remplacer une carte dans un châssis, prenez toujours les mesures de protection antistatique appropriées :

- Assurez-vous que le châssis est relié électriquement à la terre par le cordon d'alimentation ou tout autre moyen disponible.
- Portez un bracelet antistatique et assurez-vous qu'il est bien en contact avec la peau. Connectez la pince de masse à une *surface non peinte* du châssis pour détourner à la terre toute tension électrostatique indésirable. En l'absence de bracelet antistatique, déchargez l'électricité statique de votre corps en touchant une surface métallique *non peinte* du châssis.
- Pour plus de sécurité, vérifiez périodiquement la valeur de résistance du bracelet antistatique. Elle doit se situer entre 1 et 10 mégohms.
- Si vous devez mettre une carte de côté, assurez-vous de la ranger dans un sac protecteur antistatique.
- Les cartes qui sont reliées à un châssis ou boîtier métallique mis à la terre ne nécessitent pas de protection antistatique spéciale.

Manipulation de la pile

Ce produit peut inclure une pile de sauvegarde. Il y a un risque d'explosion si la pile est remplacée de manière incorrecte. Remplacez la pile uniquement par un modèle identique ou équivalent recommandé par le fabricant. Disposez des piles usagées conformément aux instructions du fabricant. Avant de vous séparer de votre équipement Grass Valley, veuillez consulter les *informations de mise au rebut et de recyclage* à:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Précautions pour les écrans LCD et TFT

Regarder l'écran pendant une trop longue période de temps peut nuire à votre vision. Prenez une pause de 10 minutes, après 30 minutes d'utilisation.

Si l'écran LCD ou TFT est brisé, manipulez les fragments de verre avec précaution au moment de vous en débarrasser. veillez à ce que le cristal liquide n'entre pas en contact avec la peau ou la bouche. En cas de contact avec la peau ou les vêtements, laver immédiatement à l'eau savonneuse. Ne jamais ingérer le liquide. La toxicité est extrêmement faible, mais la prudence demeure de mise en tout temps.

Environmental Information

European (CE) WEEE directive.

This symbol on the product(s) means that at the end of life disposal it should not be mixed with general waste.

Visit www.grassvalley.com for recycling information.

Grass Valley believes this environmental information to be correct but cannot guarantee its completeness or accuracy since it is based on data received from sources outside our company. All specifications are subject to change without notice.

If you have questions about Grass Valley environmental and social involvement (WEEE, RoHS, REACH, etc.), please contact us at environment@grassvalley.com.

Lithium Batteries

Battery Warning

<div style="border:2px solid black; background:yellow; padding:10px; text-align:center;">

<u>CAUTION</u>
This equipment contains a lithium battery.
There is a danger of explosion if this is replaced incorrectly.
Replace only with the same or equivalent type.
Dispose of used batteries according to the manufacturer's instructions.
Batteries **<u>shall only</u>** be replaced by trained service technicians.

</div>

Your Grass Valley equipment usually comes with at least one button battery located on the main printed circuit board. The batteries are used for backup and should not need to be replaced during the lifetime of the equipment.

Battery Disposal

Before disposing of your Grass Valley equipment, please remove the battery as follows:

1. Make sure the AC adapter / power Cord is unplugged from the power outlet.
2. Remove the protective cover from your equipment.
3. Gently remove the battery from its holder using a blunt instrument for leverage such as a screwdriver if necessary. In some cases the battery will need to be desoldered from the PCB.
4. Dispose of the battery and equipment according to your local environmental laws and guidelines.

> **WARNING**
> - Be careful not to short-circuit the battery by adhering to the appropriate safe handling practices.
> - Do not dispose of batteries in a fire as they may explode.
> - Batteries may explode if damaged or overheated.
> - Do not dismantle, open or shred batteries.
> - In the event of a battery leak, do not allow battery liquid to come in contact with skin or eyes.
> - Seek medical help immediately in case of ingestion, inhalation, skin or eye contact, or suspected exposure to the contents of an opened battery.

Laser Safety - Fiber Output SFP and QSFP Modules Warning

LASER SAFETY

**CLASS 1
LASER PRODUCT**

The average optical output power does not exceed 0 dBm (1mW) under normal operating conditions. Unused optical outputs should be covered to prevent direct exposure to the laser beam.

Even though the power of these lasers is low, the beam should be treated with caution and common sense because it is intense and concentrated. Laser radiation can cause irreversible and permanent damage of eyesight. Please read the following guidelines carefully:

- Make sure that a fiber is connected to the board's fiber outputs before power is applied. If a fiber cable (e.g. patchcord) is already connected to an output, make sure that the cable's other end is connected, too, before powering up the board.

- **Do not** look in the end of a fiber to see if light is coming out. The laser wavelengths being used are totally invisible to the human eye and can cause permanent damage. Always use optical instrumentation, such as an optical power meter, to verify light output.

Mains Supply Voltage

Before connecting the equipment, observe the safety warnings section and ensure that the local mains supply is within the rating stated on the rear of the equipment.

Mains Inputs for the Kahuna 9600 Mainframe

Mains Inputs for the Kahuna 6400 Mainframe

MAV-GUI Power Supplies

Each MAV-GUI that is purchased is supplied with 2 external 12V power supplies. One of the power supplies powers the MAV-GUI, the other is for redundancy.

The Power Supplies have NO user serviceable parts inside and are welded shut. Do not attempt to open the power supply cases.

External PSU for the MAV-GUI
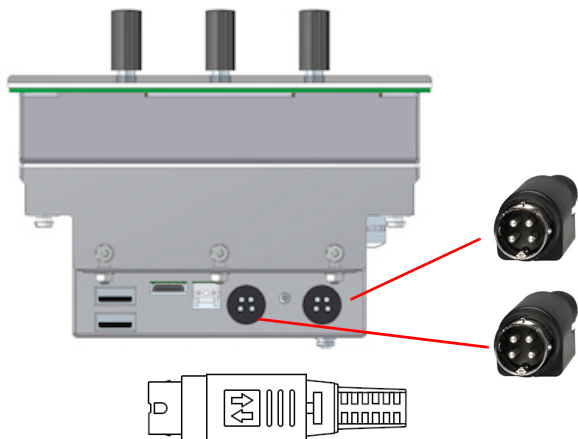
Snap and Lock type connector

Note: Make sure that the mains power is turned Off before connecting the PSU to the MAV-GUI.

The power supply connector plug that connects to the MAV-GUI is a 4 pin "Snap and Lock" type, care should be taken when connecting and un-connecting from the MAV-GUI.

Note: Do not allow the power supplies to hang freely from the MAV-GUI. Make sure that the cables are not under any stress.

Safety and EMC Standards

This equipment complies with the following standards:

Safety Standards

Information Technology Equipment - Safety Part 1

EN60950-1: 2006

Safety of Information Technology Equipment Including Electrical Business Equipment.

UL1419 (4th Edition)

Standard for Safety – Professional Video and Audio equipment (UL file number E193966)

EMC Standards

This unit conforms to the following standards:

EN55032:2015 (Class A)

Electromagnetic Compatibility of multimedia equipment - Emission requirements

EN61000-3-2:2014 (Class A)

Electromagnetic Compatibility - Limits for harmonic current emissions

EN61000-3-3:2013

Electromagnetic Compatibility - Limits of voltage changes, voltage fluctuations and flicker

EN55103-2:2009 (Environment E2)

Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2. Immunity

> WARNING
> This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

FCC / CFR 47:Part 15 (Class A)

Federal Communications Commission Rules Part 15, Subpart B

Caution to the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

> Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
> This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
> Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EMC Performance of Cables and Connectors

Grass Valley products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

SIGNAL/DATA PORTS

For unconnected signal/data ports on the unit, fit shielding covers. For example, fit EMI blanking covers to SFP+ type ports; and fit 75 Ώ RF terminators to BNC type ports

COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M and Belden 1694A (for 3Gbps).

D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having "dimples" which improve the contact between the plug and socket shells, are recommended.

Table Of Contents

7 Color Correction 99

8 Engineering Configuration 111

10 Panel Configuration 249

24 Resize. 569

25 Modulation. 589

1

Product Overview

About Kahuna

This User Manual relates to the Kahuna GUI and the operation of the Kahuna software. This manual is part 2 of 2 manuals, and is to be used in conjunction with the Kahuna Maverik User Manual, which is part 1 of 2. Please see the Kahuna Maverik 9600 and 6400 Installation Manual for connectivity of the Mainframe, the Kahuna Maverik Control Surface and Ancillary Panels.

> Note: Diagrams are for illustration purposes only.

Kahuna 9600 Mainframe
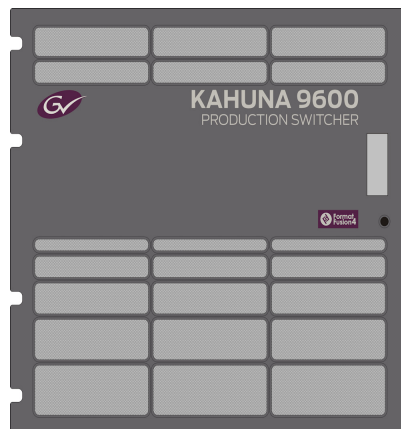
Kahuna 6400 Mainframe
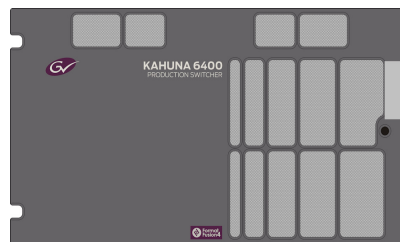
The Kahuna 9600 and Kahuna 6400 mainframes are part of the Kahuna Family of Video Production Switchers.

They both bring functionality and flexibility to meet the most demanding production requirements. Kahuna 9600 and 6400 break the tradition of fixed M/Es, fixed resources and fixed formats, and supports many simultaneous productions that would normally require multiple switchers.

The Kahuna 9600 and Kahuna 6400 have unmatched feature sets that have never been possible until now and offers a completely scalable path to all functionality and format requirements.

Up to 6 Full Mix Effects with Backgrounds A/B, C/D, 4 Super Keyers and 4 eKeys and 2 Util Buses per M/E (Kahuna 9600 Mainframe).

> Note: This User Manual refers to the operation of the Kahuna 9600 and Kahuna 6400 systems. The following sections in the manual will refer to "Kahuna", as the operation of these products is almost identical between the two systems. If there is any variation, a note will inform the user.

Kahuna Mainframe Introduction

Kahuna mainframes have the ability to mix HD, SD, single link 1080p and UHD sources via SDI, 12G-SDI and IP into a single production. The mainframes will also provide multiple outputs of SD, HD,1080p and UHD via FormatFusion3™, which is available everywhere to give the desired video format.

Example of Kahuna Maverik and Kahuna 9600

Touch-screen monitor   Kahuna 9600 Mainframe

Kahuna Maverik Control Surface
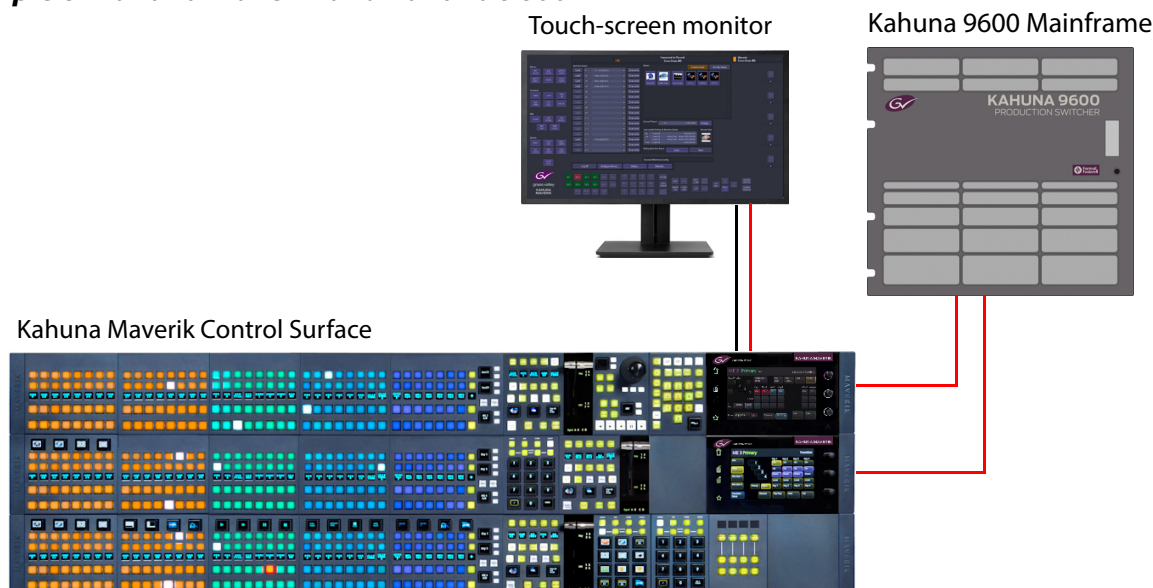
Any one of the M/E banks on the control surface may be configured to control any of the Kahuna switcher M/E's in the mainframe. Thus a system may have fewer or more M/E switching banks on the control surface than there are actual M/E's in the Kahuna mainframe, up to 16 individual studio's can be created and run from a single Kahuna mainframe.

Kahuna is designed for live studio based production, large sports production, fast paced news, mobile or multi-screen productions.

Kahuna may be configured in a number of different ways to meet requirements for video standards, control protocols, source mapping and video/Key coupling, among others. The various set-up parameters are split into two separate groups.

The configuration settings may be saved for future use allowing various set-up options to be available.

As well as the configuration set-up the actual operation set-up of the panel can be stored. This includes the selected transition, the Key sources, the still store contents and the timeline settings. All these settings are accessed via menus on the GUI and will be explained later in this manual. The Kahuna mainframe can be networked so other mainframes and even more control surfaces can be connected.

The Kahuna mainframe has up to 4 power supplies. These give n+1 or dual redundant capability. The Kahuna mainframe requires a minimum of 2 power supplies, however, this gives no redundancy.

All video input and output connections and timing signals are to the mainframe.

Kahuna has up to 120 video inputs and 64 outputs (Kahuna 9600 SDI mainframe), which may be SD, HD,1080p or UHD or any combination of all three. All of the inputs are usable as either video or Key.

Kahuna provides a full mixer/effects architecture with modifiers, wipe patterns, Linear, Non-Additive and Matte Mixes and Fade to Black.

The Kahuna 9600/6400 and Kahuna Maverik System Components

1.   *Switcher Mainframe* (Kahuna 9600 - 11RU rack height) or (Kahuna 6400 - 6RU rack height)

2.   *MAVRow Frames* - (frame that MAV Modules fit into, number of MAVRow Frames is dependent on customer design)

3.   *MAV Modules* (number dependent on customer design)

4.   *MAV-GUI* (number dependent on MAV modules ordered)

5.   *Soft MLC GUI (*Touch Screen monitor*) **Note:** Not supplied. Customer purchase*

6.   2x External DC PSU modules (per MAV-GUI)

For each MAV-GUI that is purchased, there are 16x RJ45 Comms cables supplied:

- 4x 0.5 meters ~ 1 foot 7.68 inches

- 8x 1 meters ~ 3 foot 3.37 inches

- 4x 2 meters ~ 6 foot 6.74 inches

> Note: Installation and User Manuals are supplied regardless of system components purchased.

On Receipt of the System

The equipment is supplied in dedicated packaging provided by the manufacturer and should not be accepted if delivered in inferior or unauthorized materials.

- Carefully unpack the system components and check them against the packing list. If there is anything incorrect notify your Grass Valley Partner, or Grass Valley, at once.

- Check that the equipment has not been damaged in transit. If any damage has occurred notify your Grass Valley Partner (or Grass Valley) and the carrier immediately.

- Always retain the original packing materials if possible, they could prove useful should it ever be necessary to transport or ship the system units.

Read the Installation Manual (separate manual) carefully, it will provide you with helpful hints and tips about care and maintenance and help you get the most out of your Kahuna Maverik and Kahuna.

Kahuna Mainframes and Connectors

Kahuna 9600 - (11RU) Mainframe Rear Fin Locations and Connectors
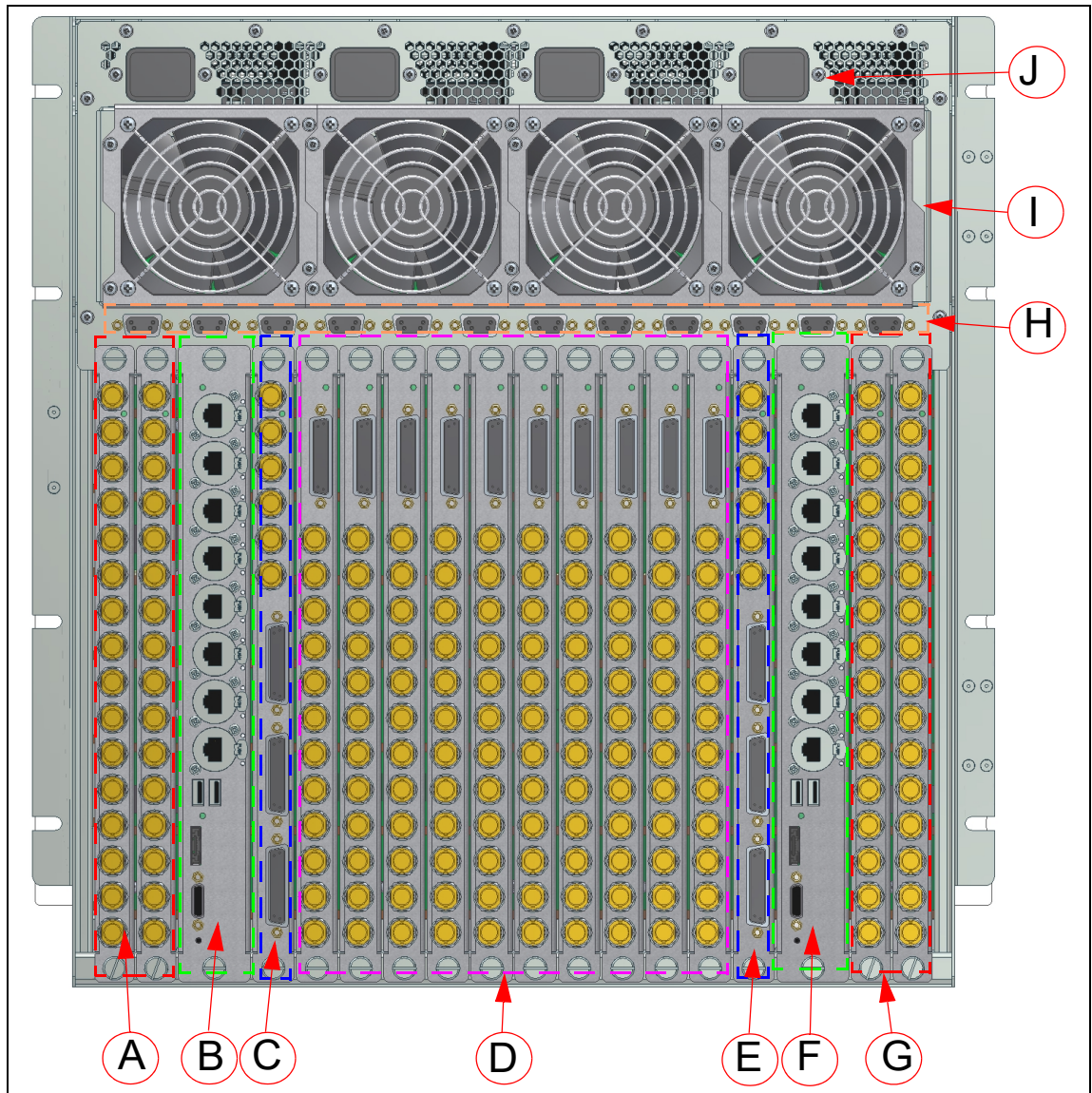
Note: The diagram above displays an SDI mainframe only. For the IP mainframe and 12G-SDI mainframe diagrams, please read the Kahuna Installation Manual.

The table below outlines a fully populated mainframe.

Mainframe Fins and Connectors

Fin/Connector	Description	Connector Information
A **Fin O/P A** **Fin O/P B**	Output Fin	Fin O/P A - 16x SDI BNC (numbered BNC 1 to 16) Fin O/P B - 16x SDI BNC (numbered BNC 1 to 16)
B **Fin NET A**	Network Fin	8x Neutrik 10/100/1000 base T 2x USB2 - for external memory device or hard drive 1x eSATA - for external hard drives
C **Fin REF A**	Reference Fin	6x Reference and Sync inputs/outputs 2x 25 Way D-type GPI connectors (1 - 24, 25 - 48) 1x 25 Way D-type GPO connector (1 - 12)
D **Fin IN A** **to** **Fin IN J**	Input Fins	120x SDI BNC Inputs total, on 10 Fins, each Fin has 12 SDI inputs, (numbered BNC 1 to 12) 1x 25 Way D-type GPO Tally connector.
E **Fin REF B**	Reference Fin	6x Reference and Sync inputs/outputs 2x 25 Way D-type GPI connectors (1 - 24, 25 - 48) 1x 25 Way D-type GPO connector (1 - 12)
F **Fin NET B**	Network Fin	8x Neutrik 10/100/1000 base T 2x USB2 - for external memory device or hard drive 1x eSATA - for external hard drives
G **Fin O/P C** **Fin O/P D**	Output Fin	Fin O/P A - 16x SDI BNC (numbered BNC 1 to 16) Fin O/P B - 16x SDI BNC (numbered BNC 1 to 16)
H **RS422-R1-1** **to** **RS422-R1-12**	RS422 Control Ports	12x 9 Pin D-type connector
I	Exhaust Fans	4x Exhaust fans, drawing air through the mainframe
J	Mains Inputs	4x 16A IEC mains inputs to the Power Supplies

The mainframe is populated with Fins from Left to Right when looking at the rear of the mainframe.

If a second Network Fin is required then a second Router Card must be installed in the front of the mainframe.

If Output Fins C and D are required for an extra 32 outputs then a second Output Card must be installed in the front of the mainframe.

Kahuna 6400 (6RU) Mainframe Rear Fin Locations and Connectors
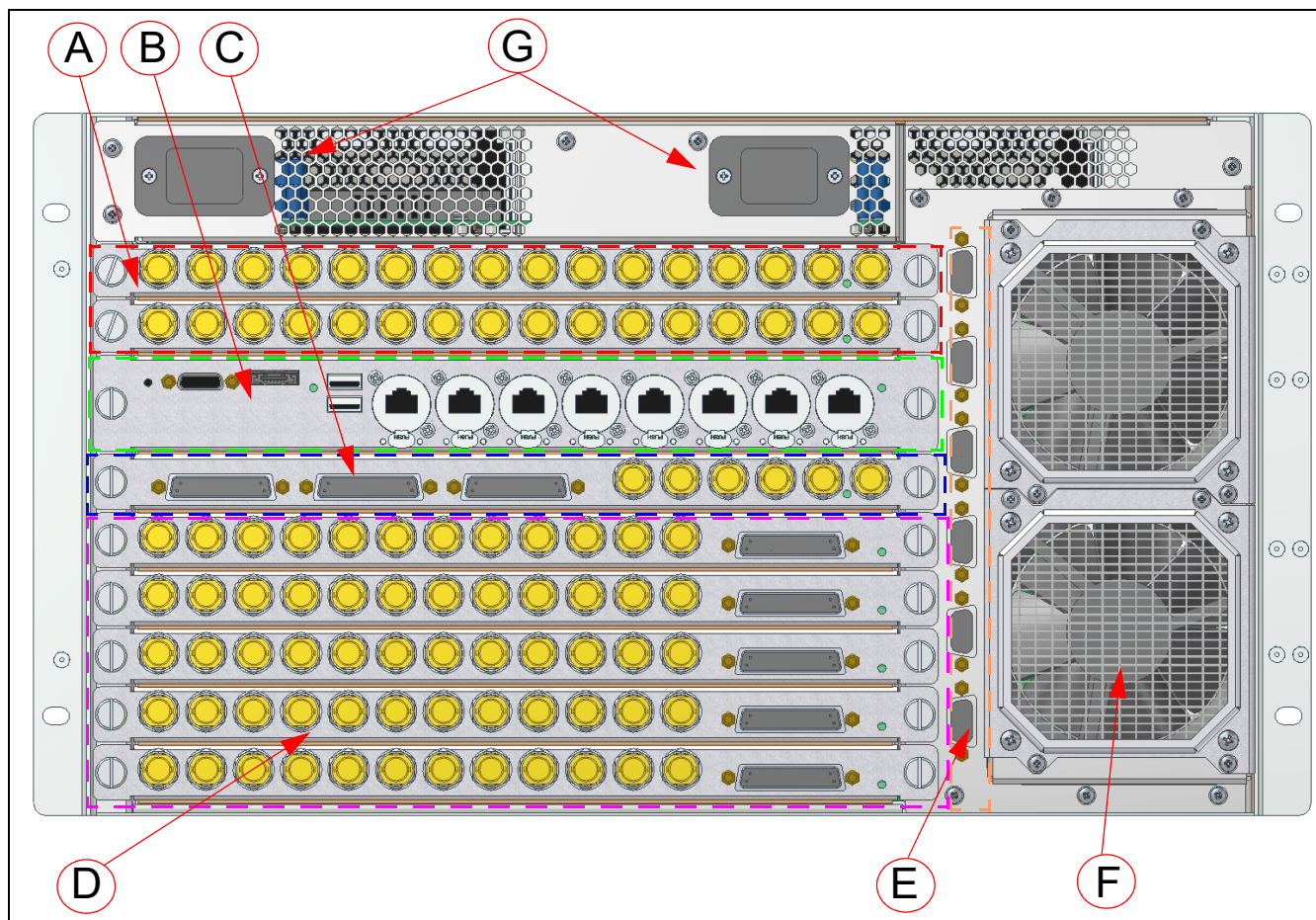
The table below outlines a fully populated mainframe.

6RU Mainframe Fins and Connectors

Fin/Connector	Description	Connector Information
A **Fin O/P A** **Fin O/P B**	Output Fin	Fin O/P A - 16x SDI BNC (numbered BNC 1 to 16) Fin O/P B - 16x SDI BNC (numbered BNC 1 to 16)
B **Fin NET**	Network Fin	8x Neutrik 10/100/1000 base T 2x USB2 - for external memory device or hard drive 1x eSATA - for external hard drives
C **Fin REF**	Reference Fin	6x Reference and Sync inputs/outputs 2x 25 Way D-type GPI connectors (1 - 24, 25 - 48) 1x 25 Way D-type GPO connector (1 - 12)
D **Fin IN A** **to** **Fin IN E**	Input Fins	60x SDI BNC Inputs total, on 5 Fins, each Fin has 12 SDI inputs, (numbered BNC 1 to 12) 1x 25 Way D-type GPO Tally connector (on each Fin).
E **RS422-1** **to** **RS422- 6**	RS422 Control Ports	6x 9 Pin D-type connector
F	Exhaust Fans	2x Exhaust fans, drawing air through the mainframe

3

6RU Mainframe Fins and Connectors

Fin/Connector	Description	Connector Information
G	Mains Inputs	2x 16A IEC mains inputs to the Power Supplies

Note: The diagram above displays an SDI mainframe only. For the IP mainframe and 12G-SDI mainframe diagrams, please read the Kahuna Installation Manual.

GUI Operation and Menu Familiarization

GUI and Menu Operation Overview

To accompany the MAV-GUI on the Kahuna Maverik control surface, a Touch Screen Graphical User Interface (Not supplied. Customer purchase), is used to display menus that setup, configure and control the production switcher system.

Please refer to the Kahuna Maverik User Manual when operating the MAV-GUI and the Kahuna Maverik control surface (**Kahuna Maverik User Manual Doc 1 of 2**).

Touch Screen GUI

This part of the document will describe how the user interacts with the touch screen GUI and its on-screen user interface.

On the right side of the display there are five slider controls, paired with five buttons, these are used to set menu parameters. All other GUI functions are adjusted using the touch screen.

Menu Diagrams in the Manual

The menus that you will see on your GUI will display the all the menu selection buttons down the left side and the delegate buttons running along the bottom of the menu, like the menu shown below:

Menu Selection
Buttons

Delegate Buttons
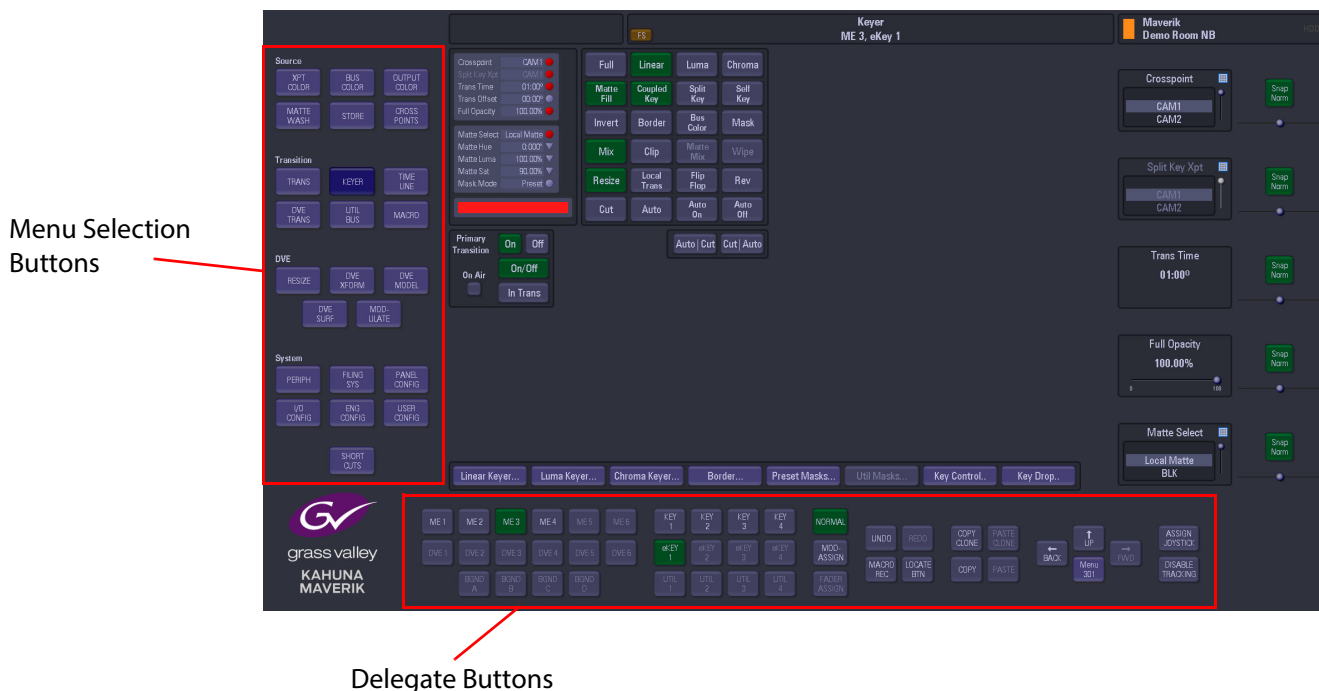
To give you a clearer image of the menus, most of the menu grabs in this manual will be a partial grab of the menu, displaying the main user area and all the parameters, as shown in the menu below:
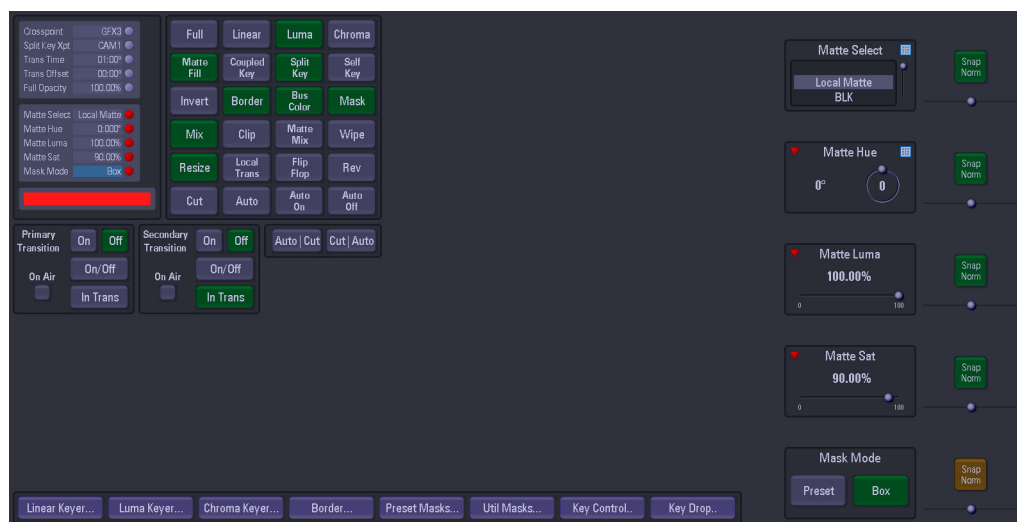
Notice that there are no menu selection buttons running down the left side, or delegate buttons along the bottom of the menu. The partial menus will also display menu link buttons to sub menus, which are always situated at the bottom of the menu.

Connecting the External Soft MLC GUI

Before setting up the Maverik control surface, the external "touch screen GUI" monitor has to be connected. The MAV-GUI has a "monitor" output port on its underside near the USB ports, the monitor port is used to connect to an external "computer" style touch screen monitor. The external monitor will run the menus which are used in conjunction with the MAV-GUI to setup, configure and use the Kahuna system. The monitor will need to have a 1920 x 1080 display resolution.

MAV-GUI

Underside of the MAV-GUI

MON (monitor) output port

USB port
When using a touch screen

Label on the
under side of the MAV-GUI

MON (monitor) output port

Monitor Lead

USB Lead
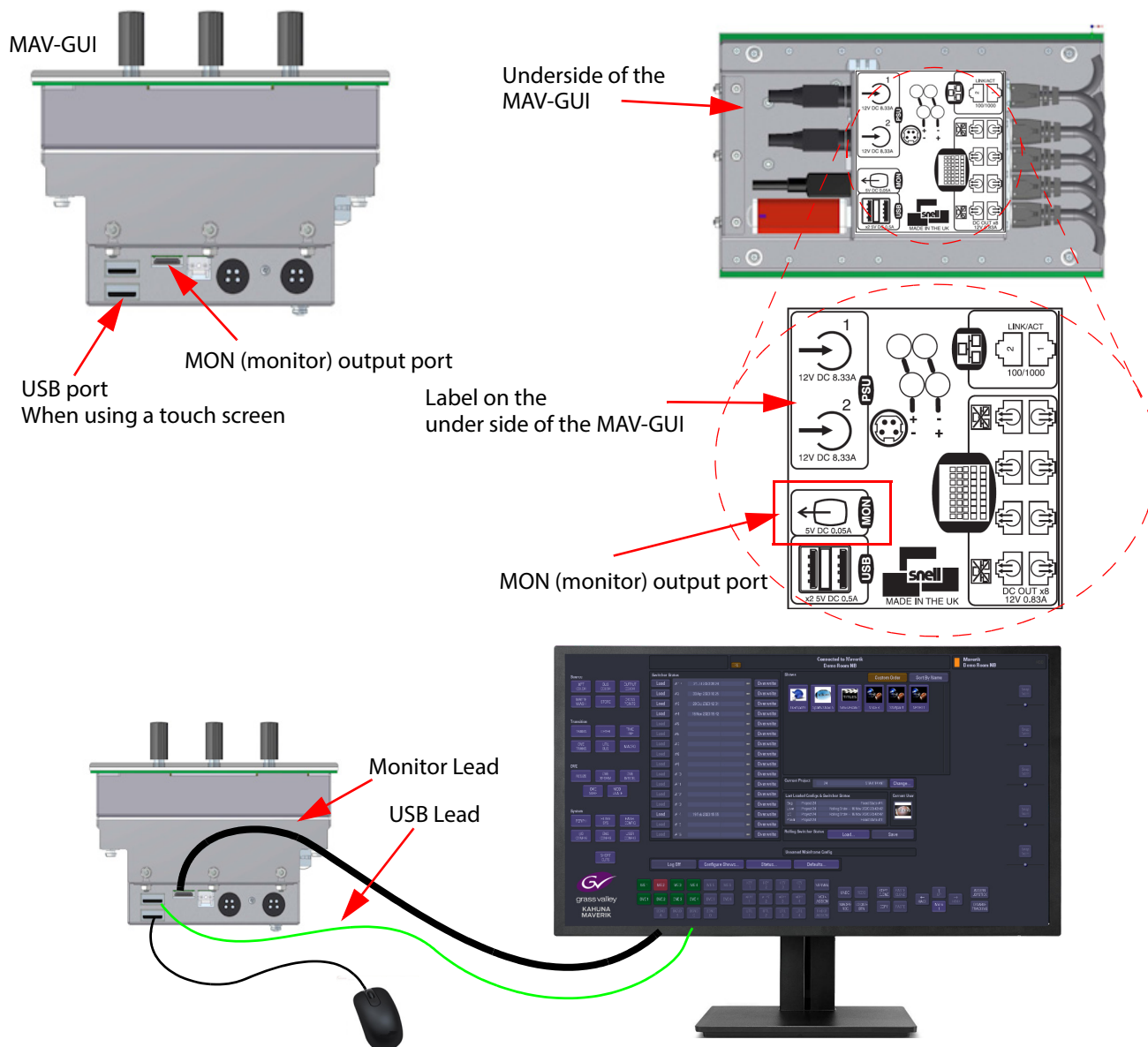
Touch screen monitor - once the external monitor is connected to the MAV-GUI, a USB control lead (also connected to the MAV-GUI - shown above) is connected, allowing the touch screen functions to be used.

Non- touch screen monitor - once the external monitor is connected to the MAV-GUI, a USB mouse (also connected to the MAV-GUI - shown above) is used to control the soft MLC menus on the monitor screen.

Mav Remote (optional)

Mav Remote Connections

The Mav Remote is an optional rack mountable/desk top hardware element that provides a means of control to the Grass Valley switcher range.

Essentially, the Mav Remote enables control of the video hardware from a remote location away from the main control surface. It allows engineering to remotely control a mainframe, operators to have a smaller means of control when used with MAV modules.

The Mav Remote has 2 external PSU connectors, one PSU can power the MAV-GUI, the other PSU is for redundancy.

The Mav Remote has a network port which connect directly to the switcher mainframe.

The Mav Remote has 8x Comms ports and can have up to 16 individual MAV modules connected to it.

Mav Remote Connections

6 Comms Ports
to connect to MAVs
on the control surface

External PSU
Connectors

2 USB Connectors

MON (Monitor) Connector

Network Port to
connect to the
switcher mainframe

2 Comms Ports
to connect to MAVs
on the control surface
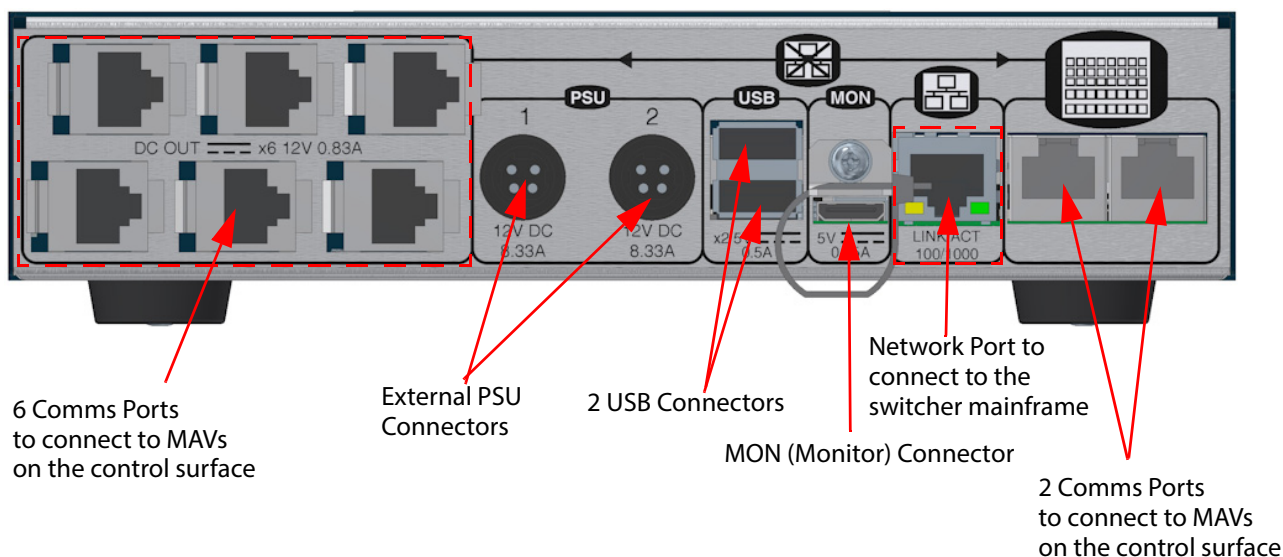
The "Monitor" connector takes a mini HDMI lead. To make sure that the lead stays in place, there is a cable tie fitted to secure the body of the HDMI lead to a plate above the connector socket (as shown below).
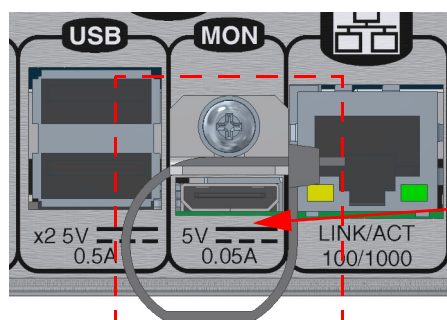
Fit the HDMI lead to the Monitor port.
Then place the cable tie around
the bracket and cable and pull the cable tie
to secure

Connection Diagram for Mav Remote Production

The Mav Remote control mechanism is ideal for Remote Production applications, forms part of a wider switcher control strategy within any production facility and can be deployed with any Grass Valley switcher.

Kahuna Connection Diagram using the Mav Remote

PVW

PGM

Multiviewer

Touch Screen Monitor

HDMI

USB

Mav Remote
Rear Connectors

USB
HDMI
Network

Remote Kahuna Maverik
Control Surface

Kahuna
Mainframe

MV Out
PGM Out
PVW Out

Remote Network Connection to Mainframe

Network

Network

Touch Screen Monitor

USB
HDMI

HDMI
USB
Network

Kahuna Maverik Main
Production Control Surface
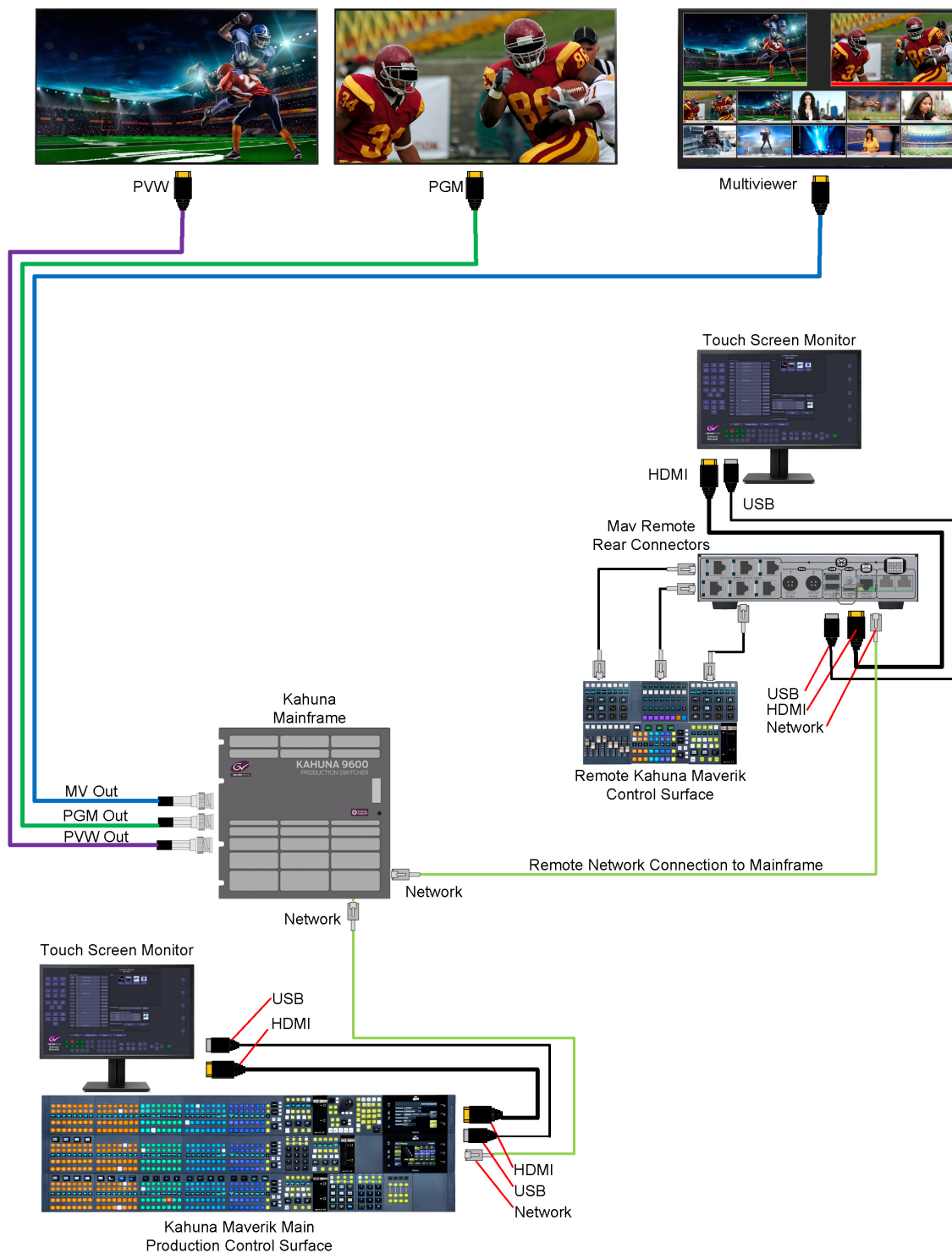
Basic GUI Button Operation
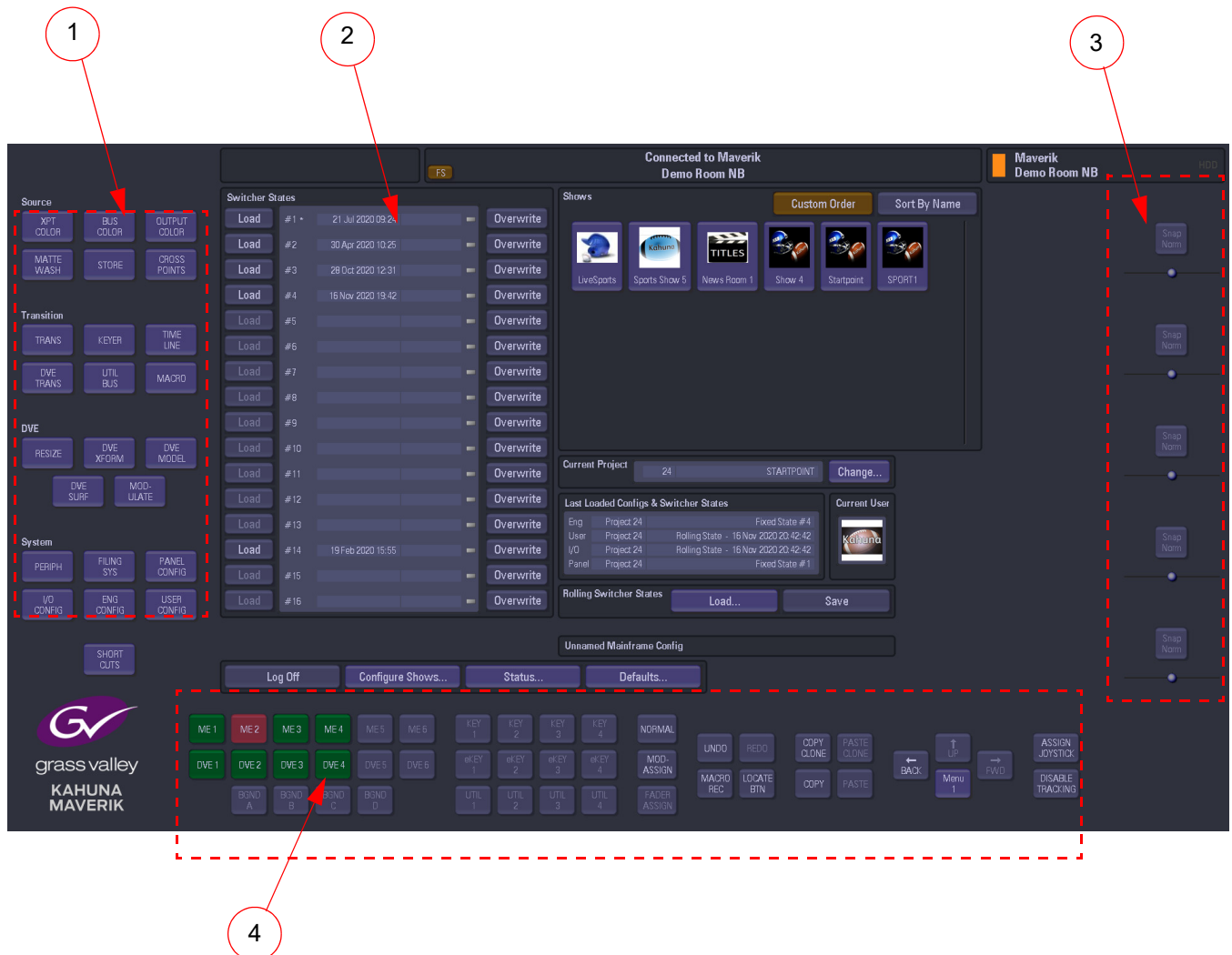
1. **Menu Selection Buttons**

2. **GUI Menu**

3. **Slider Controls and Integer Buttons for parameters**

4. **Delegate and Control Buttons**

Menu Selection Buttons

The information below highlights the main function of each button, the function of each button is described in detail

Source Buttons

XPT COLOR – crosspoint source color correction.

BUS COLOR – Bus color correction.

OUTPUT COLOR – BNC output color correction.

MATTE WASH – Matte and Wash setup and adjustment.

STORE - Setup of Stills and Clips

CROSSPOINTS – naming and setup of crosspoints and setup of Fill/Key Sources.
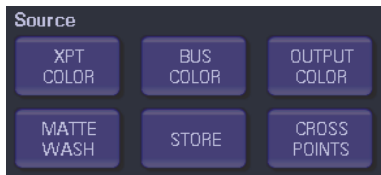
Transition Buttons

TRANS – setup Bus and Key wipe patterns and borders.

KEYER – setup Key layers for each ME.

TIMELINE – setup timeline functions.

DVE TRANS – provides DVE Presets (templates) for quick access to DVE functions.

UTIL BUS – setup each ME Utility Bus and crosspoint functions.

MACRO – creation and setup of macros.
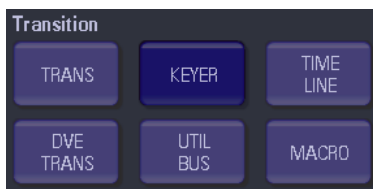
DVE Buttons

RE-SIZE – re-size and position of Key layers and Fill/Key settings and effects.

DVE XFORM - adds a final Source and Target transform to the DVE Model

DVE MODEL - list of DVE Model options

DVE SURF - setup sources for the DVE Models and special effects

MODULATE - adds modulation effects to transitions, wipes, borders, 2D effects and 3D effects.

System Buttons

PERIPH – enters the Protocol Control menus.

FILING SYS – the filing system for all saved files and projects.

PANEL CONFIG– GUI, Control Surface and Aux panel setup files.

I/O CONFIG – input and output color correction setup.

ENG CONFIG – input/output source standards, video standards, status monitoring, protocols, GPO/GPI, store setup, system setup system upgrade options etc.

USER CONFIG – setup Aux Bus, M/E Outputs crosspoint mapping, store setup for each M/E and setup of mattes and washes, eKey config and resource linking etc.

SHORT CUTS – allows access to menus that emulate button functions on the control panel.

Slider and Rotary Controls and Integer Buttons
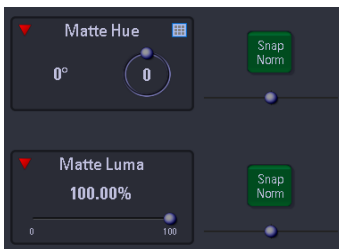
Rotary Controls - used to control parameters that have high numbers to reach.

Slider Controls – used to adjust the GUI menu parameters.

Integer Buttons – used to adjust a parameter values incrementally or snap back to a preset parameter level. Green in the default state and brown when adjusted. Touch the button twice to snap back to the default state.

Delegate Buttons

ME1 to ME6 - these buttons delegate which M/E(s) and DVE(s) the current menu is controlling. The buttons will have no effect in menus that do not control some aspect of a M/E. If all the M/E/DVE buttons are lit this means that a specific control will affect all the M/Es/DVEs.

BGND A/B and C/D - these buttons select which background layer(s) A/B the current menu is controlling. The buttons will have no effect in menus that do not control some aspect of a background layer.

KEY 1 to KEY4, eKey 1 to eKey 4 and Util 1 to 4 - these buttons select which SuperKey layer(s) or eKey layer (s) the current menu is controlling. The buttons will have no effect in menus that do not control some aspect of a Key layer.

NORMAL - a double press and release of this button normalizes all the adjustable values in the current menu.

MOD ASSIGN - assigns a modulation effect to a chosen parameter.

FADER ASSIGN - when a MAV-Aud-Fader module is connected to the control surface, this allows parameter controls to be assigned to the physical faders on the module (see the "Panel Config - Fader Attachments" section of the manual. *Note:* the "**Fader Assign**" button and the "**Fader Attachments**" menu are only available/visible if a MAV-AUD-FADER is attached to a Maverik control surface and setup in the "Maverik Layout" menu).

UNDO & REDO - will incrementally undo or redo.

MACRO REC - will record any button press sequences in **"Real Time"** to the macro function, which can then be setup within the **Macro** menus.

LOCATE BTN - this works the same way as the "Locate Button" in the "Button Info" menu. This will allow the current function of any button to be summarized in the table. Buttons with Clones and/or Macros attached will light Green when the Locate Button is Active. To locate a button Press the "Locate Button", it will go Red and the panel will only light up Normal Button (e.g. Clones, Macros attachments and Button that have had their Normal Functionality Disabled), the Table will then Display the current Information about that button. The Locate button will then return to Gray.
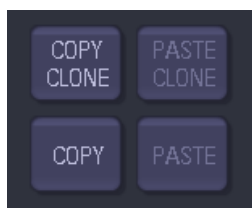
COPY CLONE & PASTE CLONE - this allows the user to clone a button function and paste to a User Function Button. When pasting a cloned button, a dialog box "Clone Paste Setup" will appear. This will allow the user to select options such as; "Lamp from Clone or, "Bitmap from Clone" when pasting to the User Function Button.

COPY & PASTE - this function enables the user to quickly and simply transfer values from one parameter to another. This function can be used to record and transfer one or two co-ordinates or even the detail of a whole M/E.
The Copy & Paste function can also be used to **Clone** functions, and allow the user to setup a system to their own operational preference.
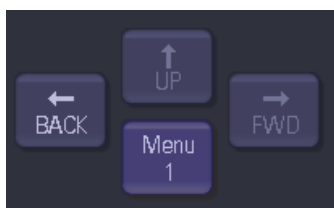
BACK, UP and FORWARD - this steps back, up or forward 1 menu.

13

Direct Menu Jump

Menu - this allows the user to dial a unique menu number or code to access the menu. The user can discover/learn the unique numeric menu code of any menu by navigating to it in the normal way. Once there, the menu number is displayed on the **{Menu}** button under the arrow **{UP}** button.

To get back to a specific menu, press the **{Menu}** button. The '**Direct Menu Jump**' pop-up menu is displayed. Using the keypad in the center of the pop-up, enter the number for the required menu, and press **{Enter}** to jump to the required menu. If a menu number is not recognized, the enter button flashes just briefly red to indicate a problem.
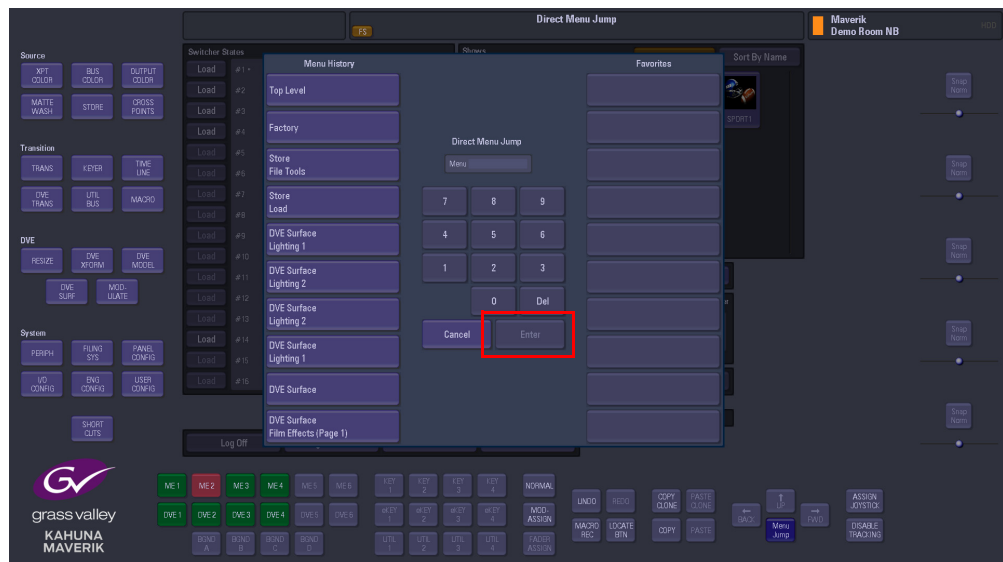
The "**Direct Menu Jump**" menu has two additional features. A 'scrolling "**Menu History**" is shown on the left of the pop-up. Any of the previous ten menus can be jumped to by pressing one of the buttons on the left.

> Note: A jump to a menu in this recent history will move that entry back to the top of the list, rather than add another instance of it.

Menu
History
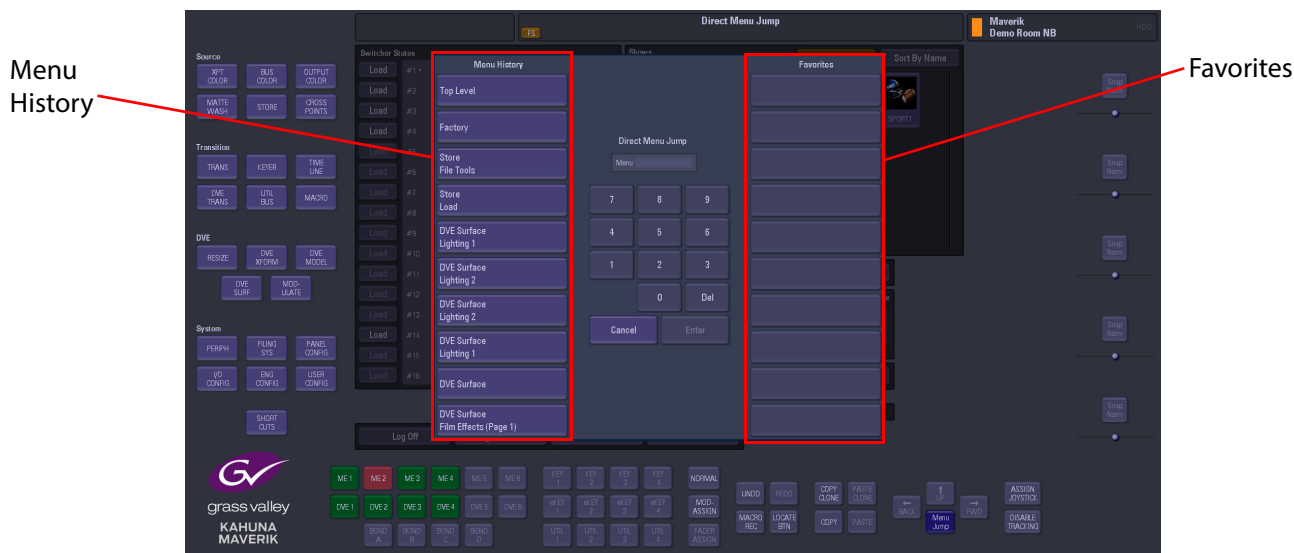
Favorites

Also available is a "**Favorite**" menu system. This works like the preset buttons on your car radio. To use this feature, once in a menu that the you want to save as a '**Favorite**' - open the '**Direct Menu Jump**' pop-up menu, then press and hold one of ten buttons on the right underneath the 'Favorites' heading. After about 2 seconds, the title of the required menu will appear in that button. To select the menu, just press and the menu will open. It is used the same way as the Menu History buttons. Overwriting a saved Favorite menu is done by simply navigating to the required menu and then opening the Direct Menu Jump menu and touching and holding a Favorite button that already has an attached menu.

Using the GUI Menus
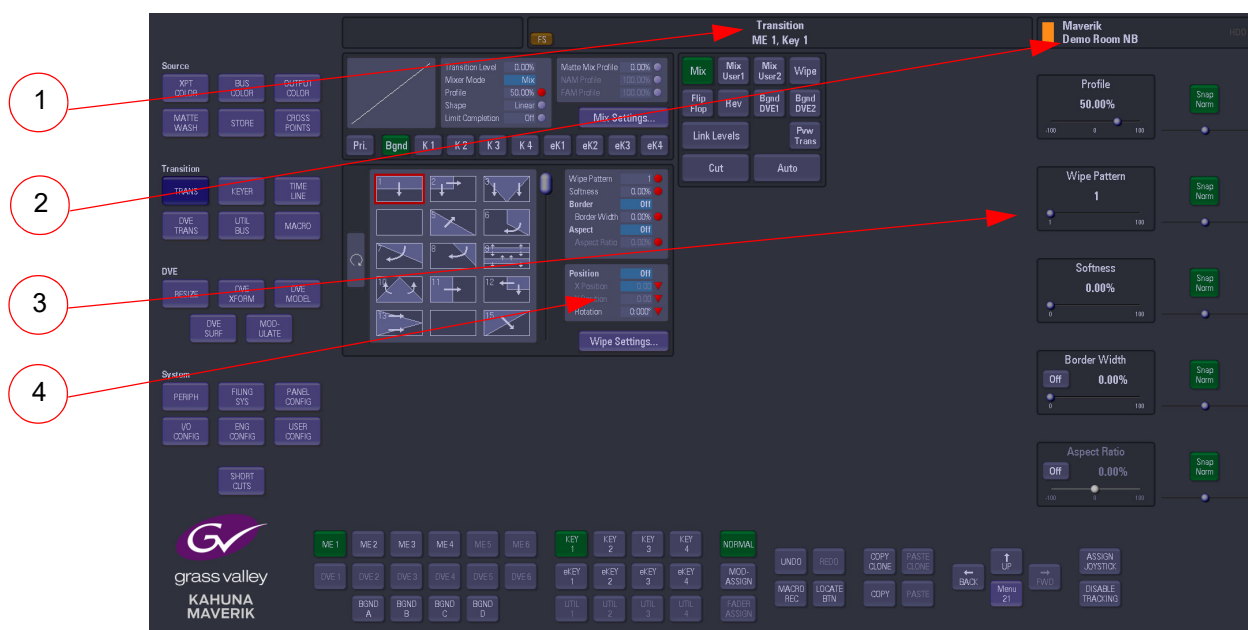
1. **Title Bar**

2. **Connected Mainframe**

3. **Parameter Controls**

4. **Attachers with Parameters**

Title Bar

All menus have a title bar situated at the top of the menu and from one to five analog display areas situated down the right side of the menu.
The bar to the right of the "Title Bar" displays the mainframe that you are currently connected to. It also displays the status of the hard disk drive "HDD"

The title bar shows the full title of the current menu. A second line in the title bar will indicate the mainframe the system is connected to, or that it is controlling a particular M/E, Background or Key.

Note: Touching and holding the Title Bar at the top of the menu allows you to make the current menu the default menu to jump to when logging into the mainframe. This action is saved in the "Panel Config" file.
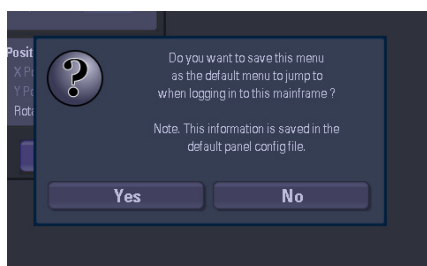
Parameter Controls & How to Adjust Parameters

On the right hand side of the GUI menu are the parameter controls. These controls are linked to parameters within a selected attacher. If a parameter attacher has a Red triangle, this indicates that the adjustment can be made using the Joystick.
When active the parameter indicators will turn RED.

Parameters controls can be adjusted by touching a horizontal slider and moving left or right as required. This is good if the parameter value needs to be adjusted by a large amount.

Move Sliders left or right
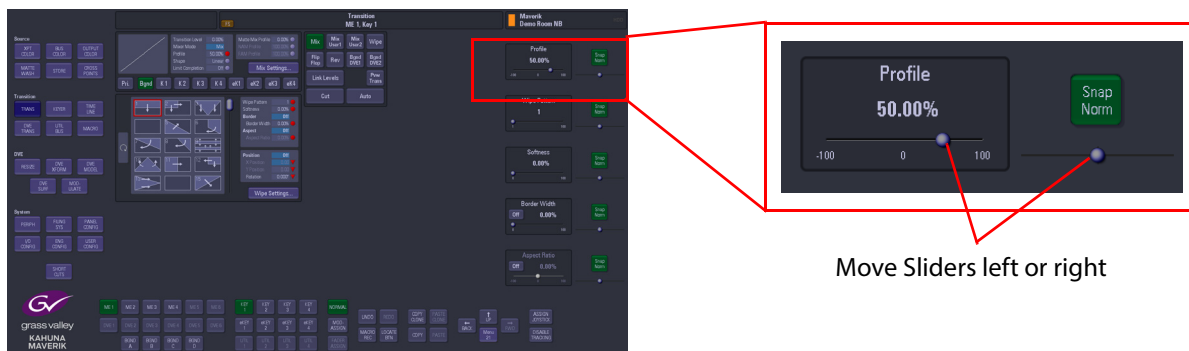
A more precise method of controlling and adjusting parameters is to use the rotary controls on the MAV-GUI. Touch the "**Star**" button situated at the bottom left of the MAV-GUI screen. The "**Star**" button will turn purple and reveal a dialog box in the center of the MAV-GUI screen.
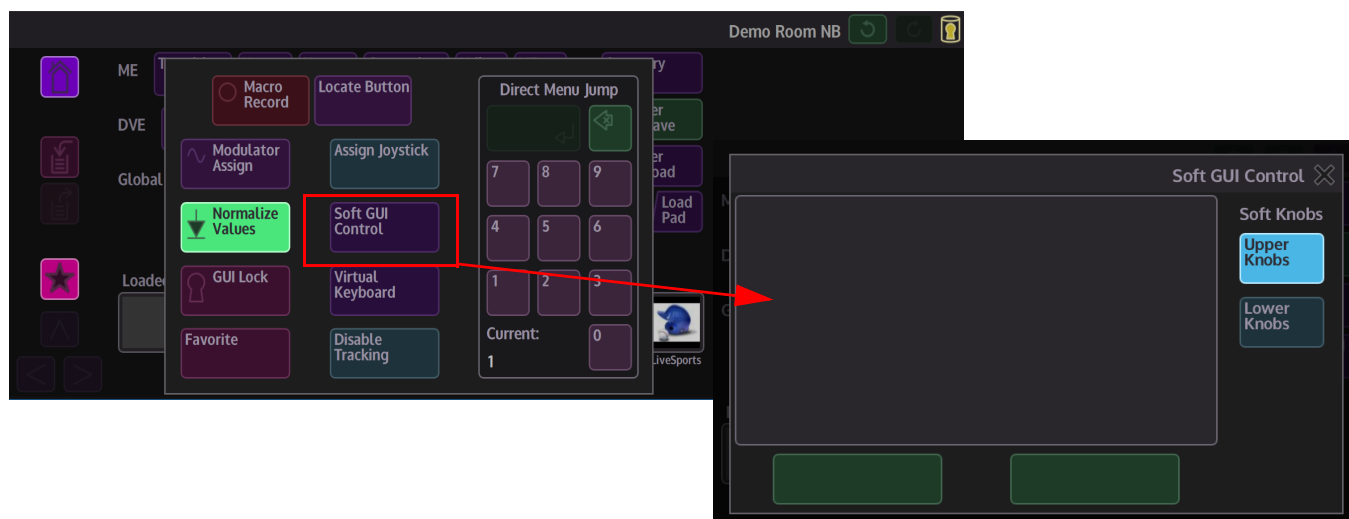
Touch the **{Soft GUI Control}** button and the "**Soft GUI Control**" menu is displayed, notice also that the parameter controls on the large touch screen GUI have a colored square next to then that corresponds to the rotary controls on the MAV-GUI.
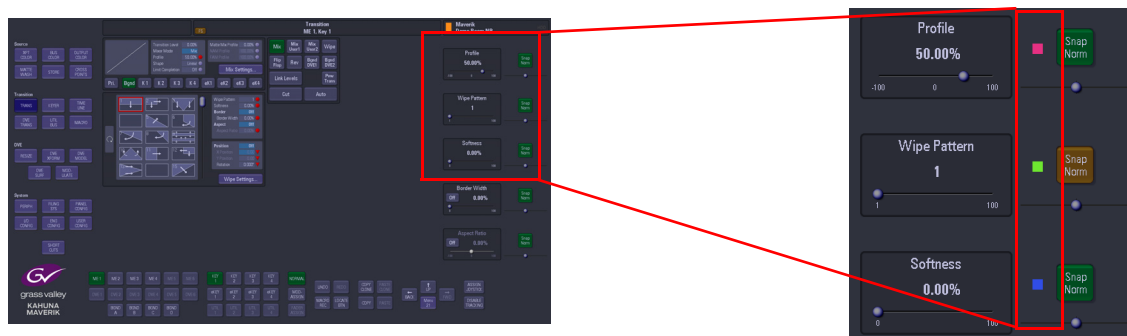
In the "**Soft MLC GUI Control**" menu, if you touch the **{Upper Knobs}** button, parameters 1, 2 and 3 are attached to the rotary controls. Touch the **{Lower Knobs}** button attached parameters 3, 4 and 5.

Below are examples of groups of attachers within menus. Touch an attacher and the parameter indicators will turn red.

Examples of Attachers

Inactive Controls are Gray

Active Controls are Red
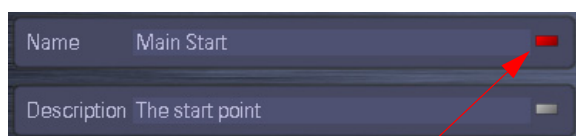
A Triangle shows that the Parameter can be Controlled with a Joystick

Name Attacher
Touch the Red oblong control twice
and an on-screen keyboard will appear
allowing the user to give the function a name

On entry to a menu, multiple attachers may already be selected as shown in diagram "**A**" this allows the user quick over-all parameter adjustment.

For a more detailed adjustment, touch the attacher box and all the controls will turn Red as shown on diagram "**B**" allowing the user to adjust all parameters within the attacher.

A
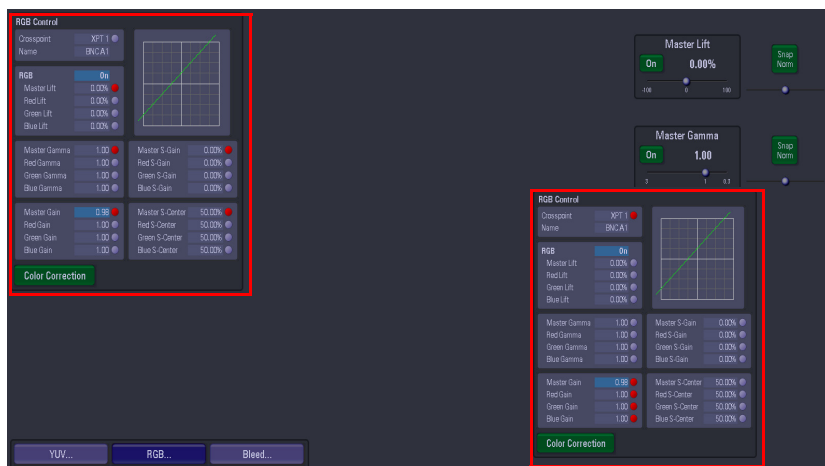
B
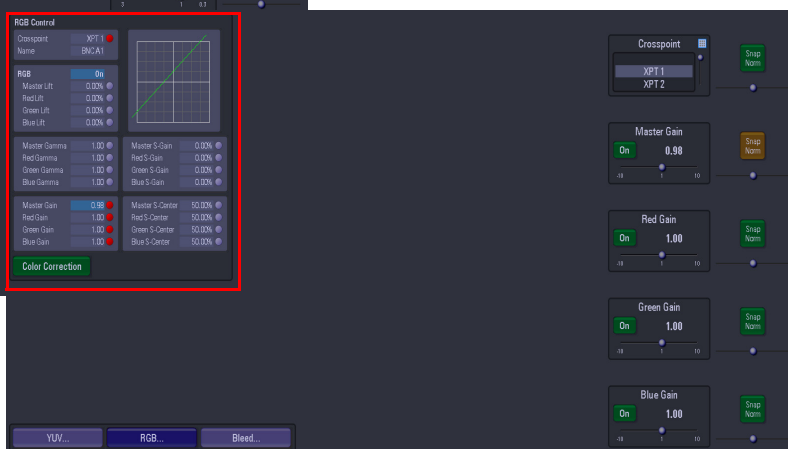
Other Menu Functions

Menu Link Button
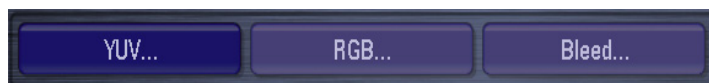
Menu Link buttons allow the user to enter a sub-menu, mainly shown at the bottom of menu's.

Action Button

When pressed the Action buttons apply the selected action to a menu. The buttons go Green when active.

Pop-up List Selector

Some parameters will have a Blue square in the top right corner, these are Pop-up List Selectors. Touching this button will display an "options dialog box". This allows the user quick access to all options available in the selected parameter, without having to use the parameter control to scroll through all the options.

Multi-press Button Modes

The **SNAP NORM Integer** buttons situated next to the parameter controls on the GUI have a **Double Press** function.
The button has two states, when it is illuminated Green this indicates that the currently selected parameter is in its default state. When the parameter control is turned, the button will turn Orange, denoting that the currently selected parameter's value has been changed.

Press the Button once again and it will illuminate Red for two seconds, notice that the parameter has jumped to an incremental value, normally in steps of five or ten.

Double Press the button and the parameter will revert back to its original default state, the button will once again turn Green.

Press and Hold the button and the menu will display a number Keypad, allowing a parameter to be adjusted using the numeric keypad (only on selected menu's).

Time and Timecode Adjustments
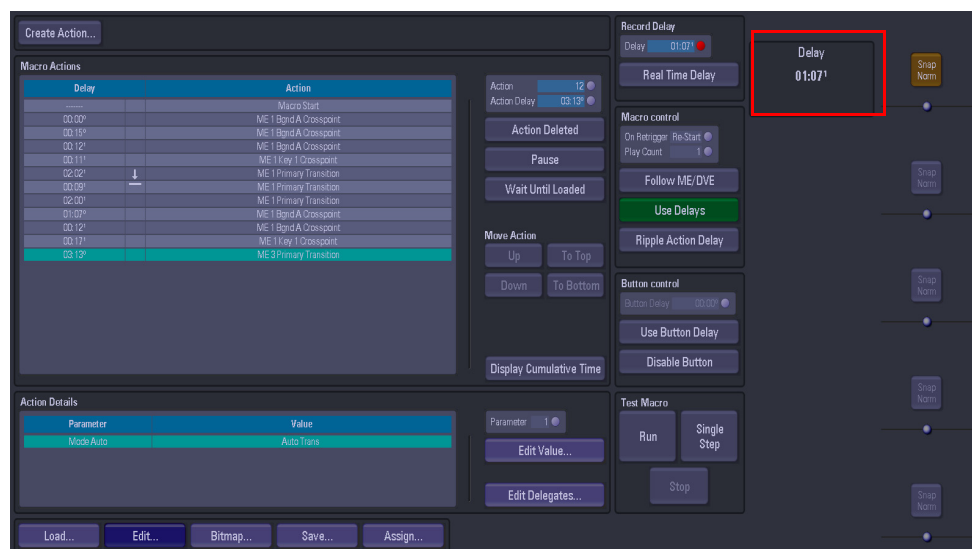
It is worth mentioning that some menus described in this manual will have the option of adjusting the duration of **Seconds**, **Frames** and **Fields**, as shown in the diagram the adjustment can be made using either the parameter controls or using the numeric key pad as described below.

This Example: - Action Delay: 01:07[1]

This shows the duration as, 01(seconds):07(frames) [1](fields)

On-Screen QWERTY Keyboard
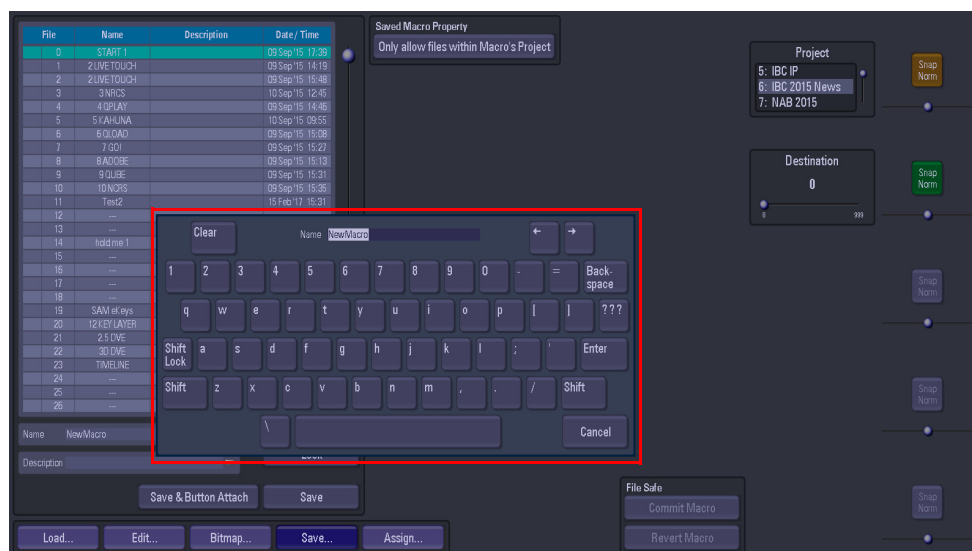
The GUI has an on-screen QWERTY keyboard option that can be used to enter text into a name attacher.
Any menu that has a name attacher will display the GUI QWERTY keyboard, to do this, touch the name attacher box twice and the keyboard dialog box will appear on the screen. Enter the chosen name (text entry is displayed at the top of the keyboard dialog box), then press **"Enter"**. To return to the original menu screen if no changes are made to a parameter, press the "**Cancel**" button on the keyboard.

How to Save Files **4**

Saving Files Overview

Kahuna is a very flexible system and gives you a number of options to Save. There are Switcher States, Rolling Switcher States, Effects Memory Recalls (DMEMs, GMEMs and Snapshots), Shows and individual Configuration Files. This sounds like a lot of options, but how they are applied will depend on what you want to do with the system.

All of the above ways to save are saved into a Project. Once a Project has been created, the user is able to save files in several different ways. The user can save individual "Config" files while working in the User, Panel or Engineering Config menus, or they can save DMEMs and GMEMs. DMEMs and GMEMs Store user-defined setup states of the M/E or the overall setup of a Kahuna Control Surface and form a comprehensive "**Advanced Effects Memory Recall Systems**". This means that the user has the flexibility to save or recall setup's instantly. The Switcher States and Rolling Switcher States are an instantaneous save of the current setup state of the system.

> Note: How to setup and use "Shows" will be explained in full in the "Connect and Initial Setup" chapter of this manual.

Switcher States

The fastest way to save the current system setup state is done by using the "**Switcher States**" **{Overwrite}** option. Touch the "**Up**" button to get to the "**Connected to...**" menu and the Switcher States table is displayed in the center of the menu.

The table of 16 fixed Switcher States are used as a one button press **"Save and Load Everything"** function that can be written to an unlimited number of times. Switcher State - Overwrite allows the user to save the current **"Switcher State"** at different points in time. This is very useful as you may want to keep the current original saved state, but may also want to add a newly created DMEMs or add Stores etc, which can be saved in one of the Switcher State slots.

This is done by pressing the **{Overwrite}** button. The date and time that the Switcher State was saved (overwritten) is displayed in the list. By touching the boxed area next to the time and date, a name can be given to the Switcher State using an on-screen keyboard. Touch **{Load}** button to load the saved Switcher State.

When overwriting an already saved switcher state, a dialog box will be displayed, touch "OK" to proceed. **Caution!** - If you press the **{Clear File}** button, the switcher state will be erased.

Rolling Switcher States

Rolling Switcher States is the method of quickly saving the overall state of the system. This allows the user to save up to 100 Switcher States in to a **"Rolling List"** of saved states, which will keep rolling over after 100 states have been saved. The **"Rolling Switcher State"** function is different to the Switcher State Overwrite mentioned above, because when the user touches the **"Load"** button, the menu will change to display a list of saved states and the option to change or select a Project. You can also set any one of the switcher states as the default startup state.
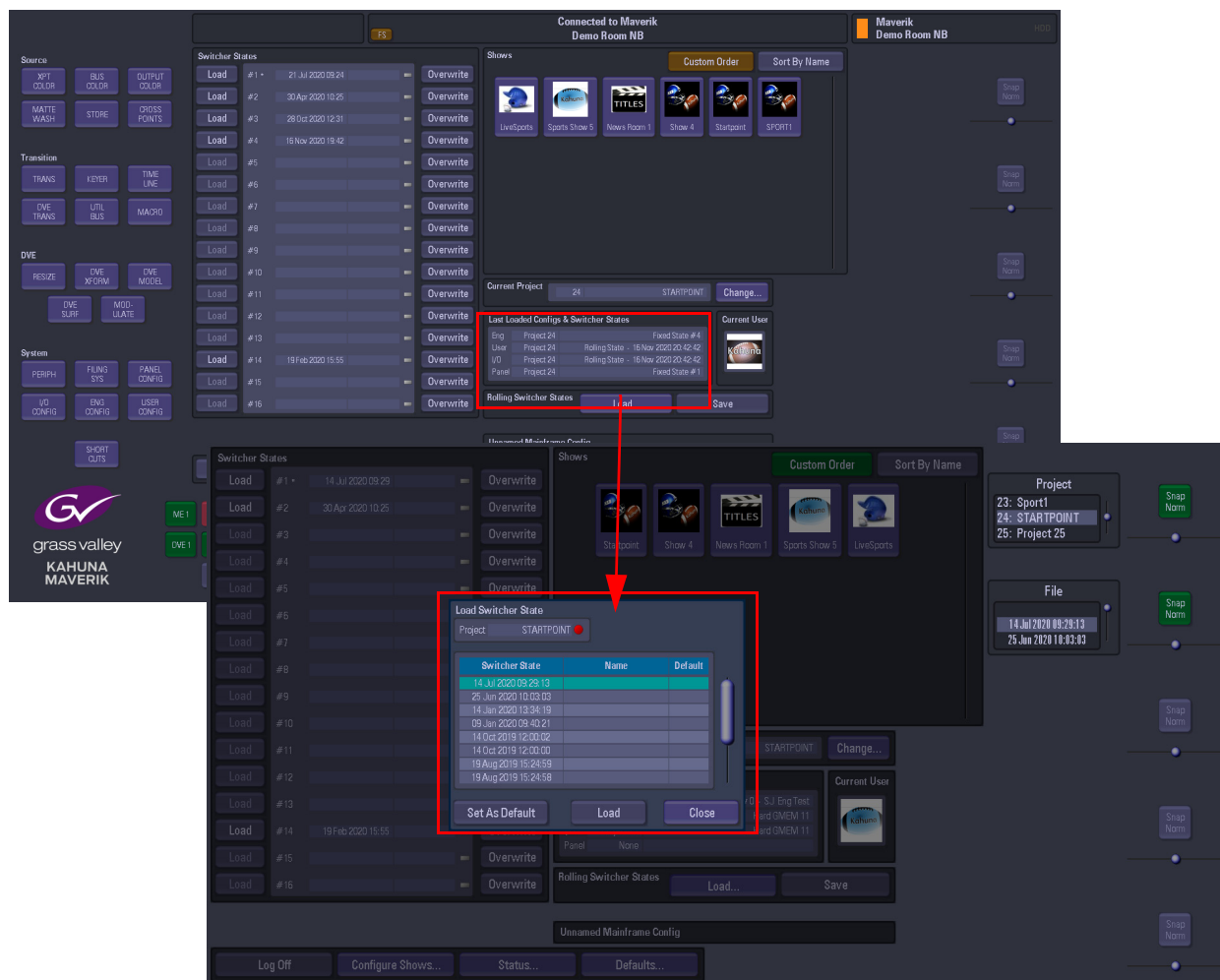
Each time the **{Save}** button is pressed a switcher state is saved into the rolling list.

Saving and Loading Config Files

The User, Panel and Engineering Config files are very important when setting up a system and should be saved regularly so that your configuration state is not lost. User, Panel and Engineering Configs can have up to 1000 different config setup states each. When the config setups are saved, they are listed as files in a table in the menu, so that the user can easily see the time/date that a config was saved, allowing the file to be instantly loaded.

> Note: This example will show how to save and Engineering Config File. Saving or loading a User Config or Panel config File is done in exactly the same way.

The Configuration files are used to determine the startup state of the system and it is important to know what selection state the "Enables" within the config file are in, i.e. what is enabled/disabled when saving the config files, when creating DMEMs and Macros.
The "**Enables**" list of buttons, to the right of the config files table, allows you to select or de-select functions that will be saved within a file. If the tab next to the enables button is green, this means that the enabled function is included in the original saved file. If the tab is gray, the function is not included. If the enabled function is selected (green) when the config is saved, the function will be included in the saved config.
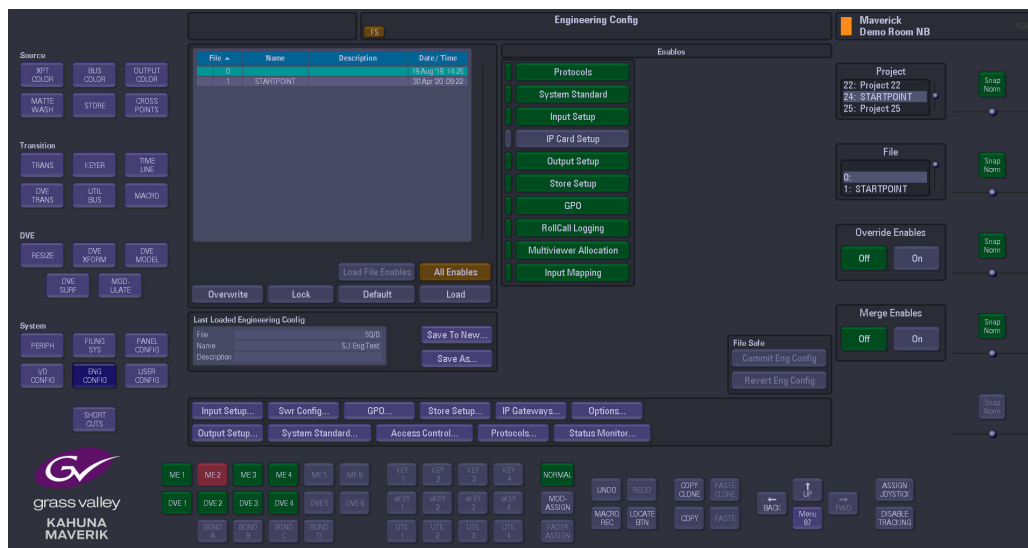
Saving a Config File

To save a configuration file, touch the {**Save As...**} button and a new menu will appear. The "**Engineering Config - Save As**" menu allows you to select a new slot in the table and save an Eng Config file. Use the "**Name**" attacher box to give the config file a name, touch the red oblong at the end of the "**Name**" attacher and an on-screen keyboard will be displayed. Type a name for the file, then when finished touch the {**Save**} button. There are 1000 slots available to save to.
If you touch the {**Save As...**} button when an existing saved config file is selected, a dialog will be displayed asking the you if you want to proceed to save the file.

Loading a Config File

To load a config file, simply select a file by touching it in the config file table and then touch the **{Load}** button.
You can choose to enable or disable any of the "**Enables**" before touching the Load button.
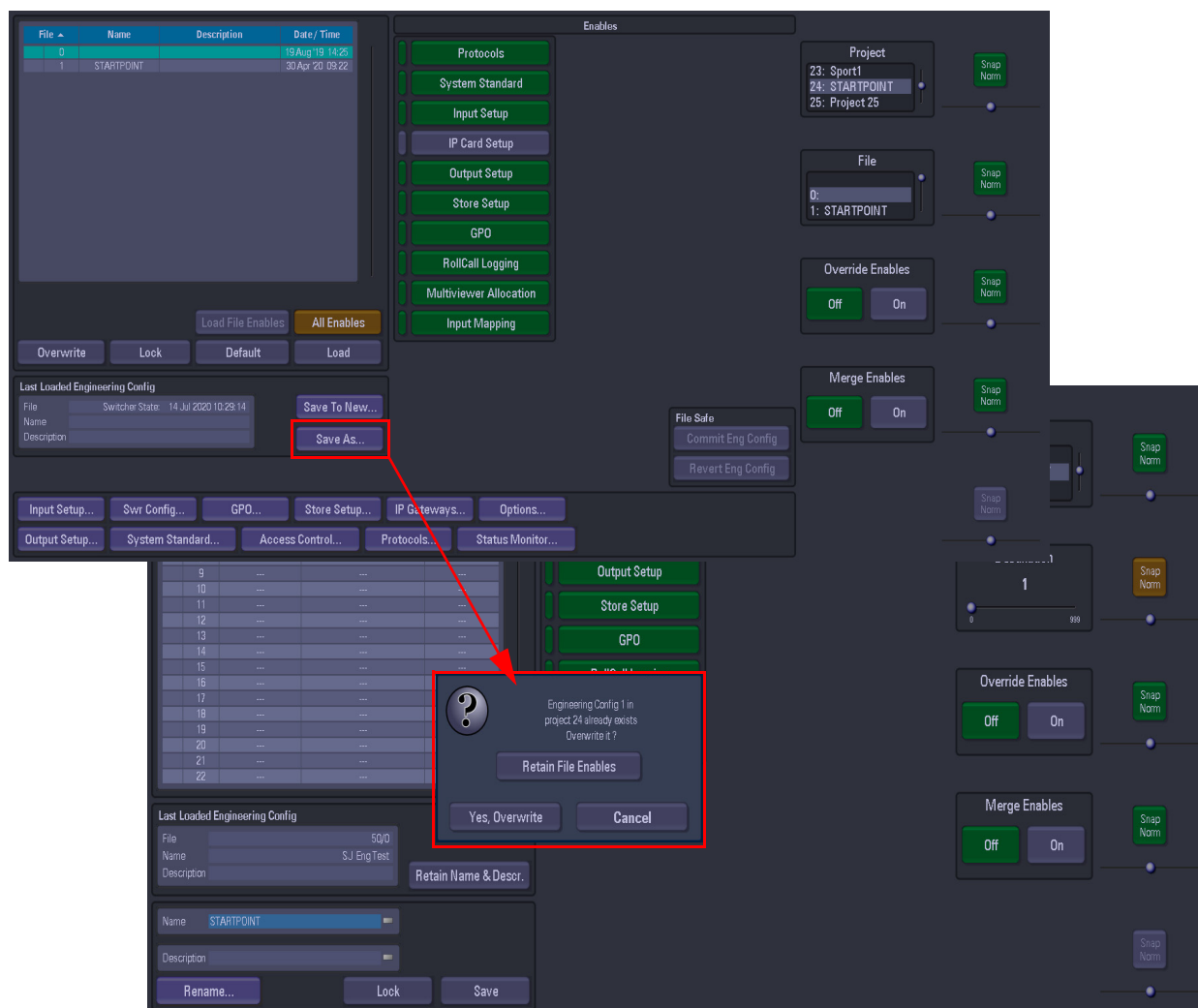
Snapshots

Snapshots as the name suggests will take a snapshot save of the current system setup. They can be applied to the OLED buttons on the MAV-UFBPAD or the MAV-AUTO modules, but can also be applied to one of the OLED button on the MAV crosspoint modules. Once they are saved, they are an instant recall of the saved system setup.

Saving a Snapshot

Press and hold one of the OLED buttons on one of the MAV modules mentioned above, and you will hear an audible "beep", this signifies that a snapshot has been taken. The OLED button will display "SnapShot" and the snapshot number.

In the Filing System menu, touch the **{Snapshots...}** button to open the Snapshots filing system menu.
The menu displays a table with all the snapshots taken. to the right of the table, the enables associated to the snapshot are displayed.
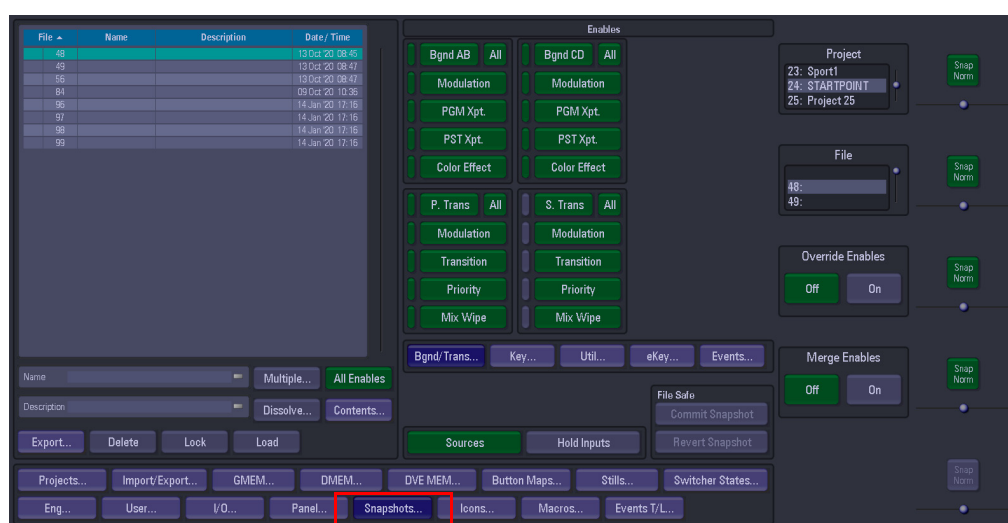
In this menu, Effects Dissolve can be added to an existing snapshot allowing you yo make creative effects.

> Note: How "Effects Dissolve" works with Snapshots will be explained in the "Operator Information" chapter in this manual.

Detaching Snapshots

Snapshots are attached to the OLED buttons when saved, you can detach a snapshot from an OLED button in two ways. The first is to go into the Panel Config - Preferences - Panel menu (shown below), where you have a few snapshot options. One of the options is "Remove On Hold", which means that if a button has a snapshot, and you press and hold the button, an audible beep signifies that the snapshot has been removed. For this to work, in the same Panel Config menu, make sure that the "Overwrite" parameter is set to "Off" or you will just be overwriting the snapshot on that button.
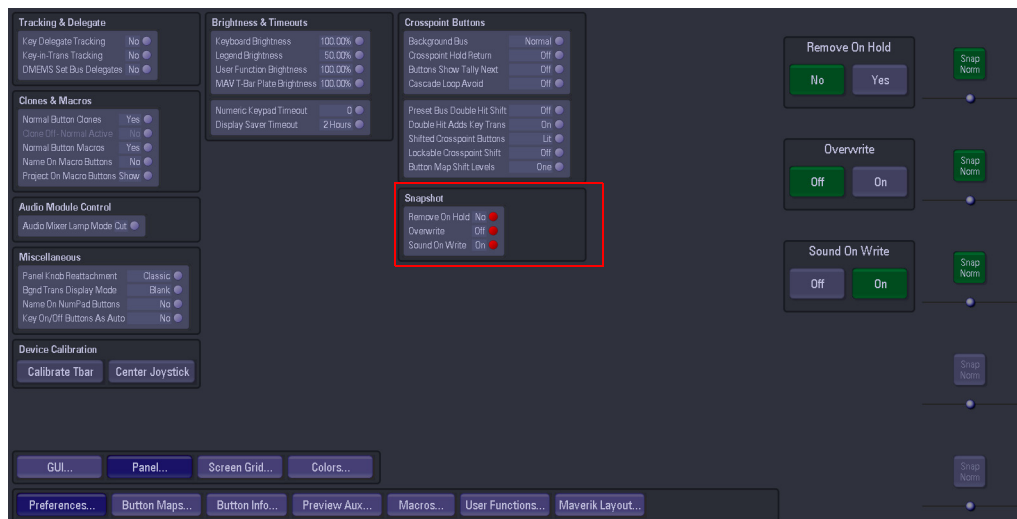
The other way to detach a snapshot is done in the "**Panel Config - Button Info**" menu.
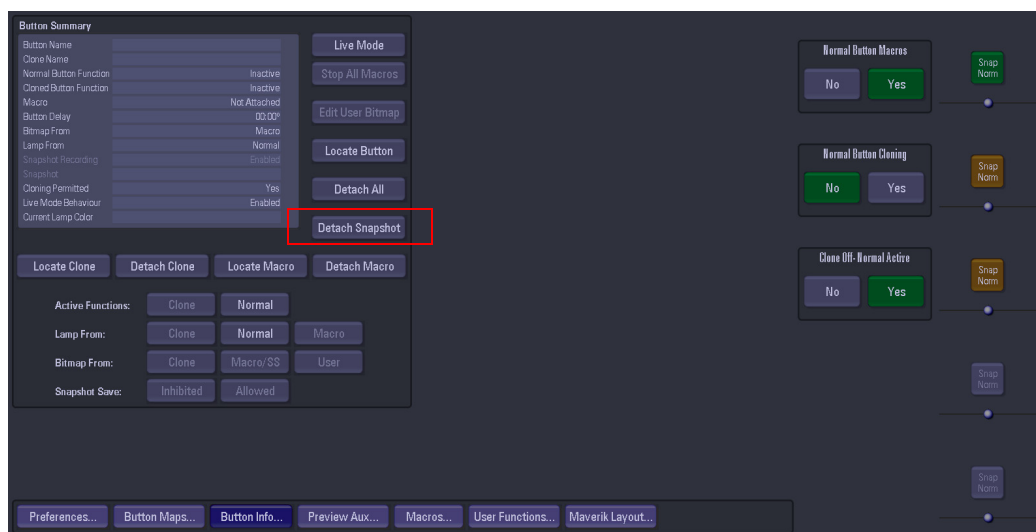
To detach a snapshot touch the **{Detach Snapshot}** button and the button will turn red, then touch the snapshot button and it will be detached.

Detaching a snapshot does not delete the snapshot from the system memory, the snapshot can be re-loaded by selecting the snapshot in the table in the "**Filing System - Snapshots**" menu, then touching the **{Load}** button.

Projects DMEMs and GMEMs

Projects DMEMs and GMEMs Overview

It is very important to understand the relationship between Projects, DMEM's and GMEM's. Kahuna is a project driven system where the user is able to create 98 individual projects to store and save their work and the user defined setup of the system.

DMEMs and GMEMs store user defined setup states of an individual M/E or the overall setup of a Kahuna Control Surface and form one of the most comprehensive "**Advanced Effects Memory Recall Systems**" of any Production Switcher, this means that the user has the flexibility to save, call or restore setup's instantly. They are easy to use, and one of the most important features of a Kahuna system.

Using Projects

As stated earlier Kahuna is a Project based system where all DMEMs, GMEMs, Panel Configs, Stills, Macros and other files are Stored into individual user-defined Projects. To get to the Projects menu touch the **{Filing System}** button on the GUI and the first menu that will appear will be the Projects menu.

As you can see from the diagram above, Projects are in number order in the table, it also allows the user to see what number can be chosen for a new Project i.e. any number that is not in the table.
The columns depict the user-defined name given to the Project and the number of DMEMs, GMEMs, Panel Configs, Stills, Macros and other files saved within that Project.
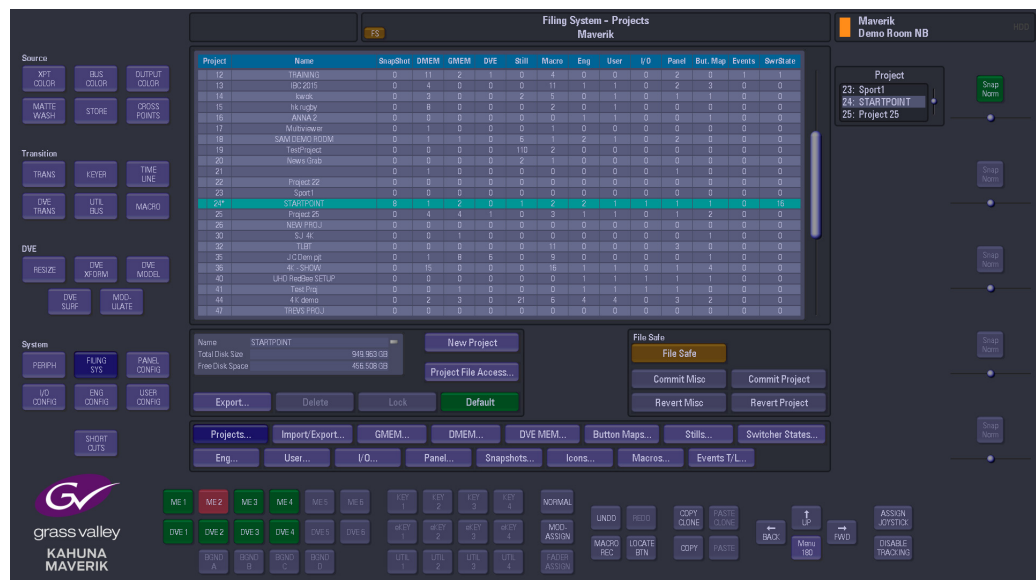
How to create a new Project

To create a new Project, use the **New Project** parameter to select an unused Project number and then press the **{New Project...}** button.
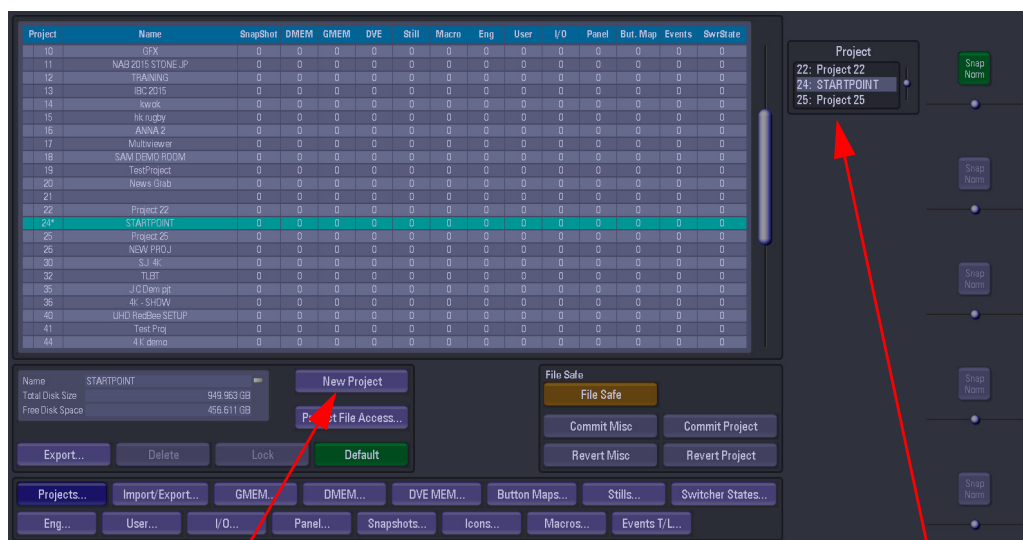
New Project button

Project Parameter

A dialog box will be displayed, with a scroll bar that allows the user to select a project number from the number list.
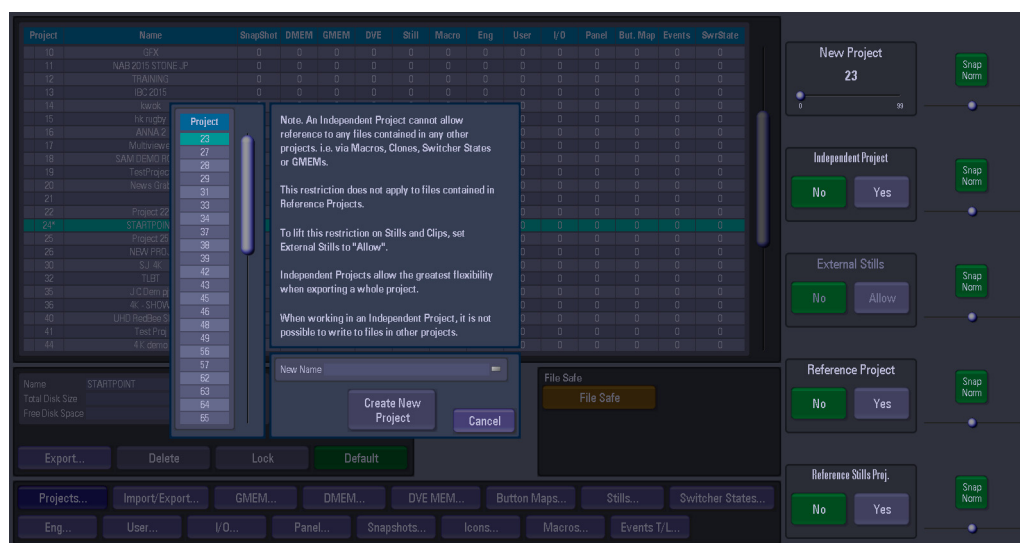
The new Project can now be used.

> Note: Projects will be described in detail in the "Filing System" chapter of this manual.

A name can be given to the new Project by touching the Red name attacher button twice, and then entering the name using the on-screen keyboard. Touch the {Enter} button to clear the keyboard from the menu.
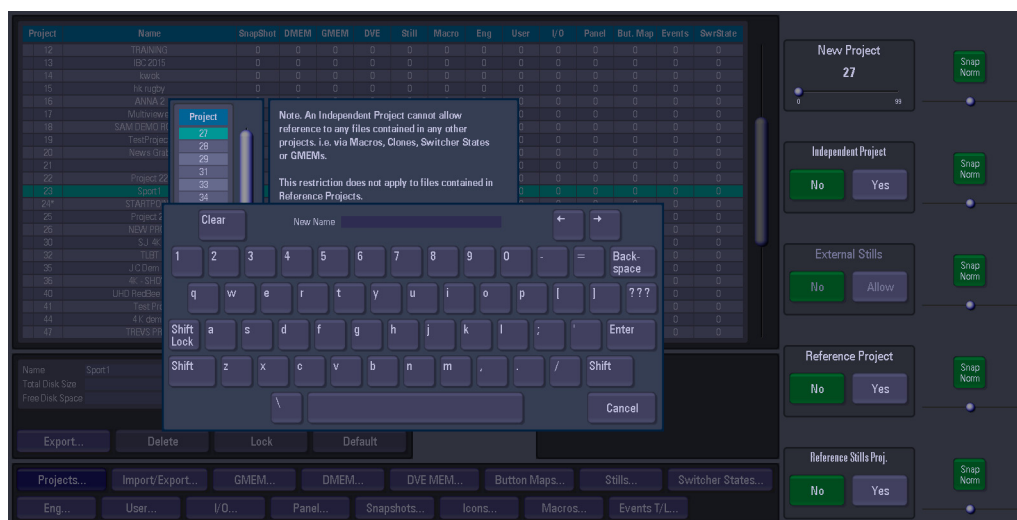
The user now has a few options before finally creating a new project. The new Independent Projects feature allows the user to create projects that can only have files from Macros, Stills, DMEMs etc. saved within that project.
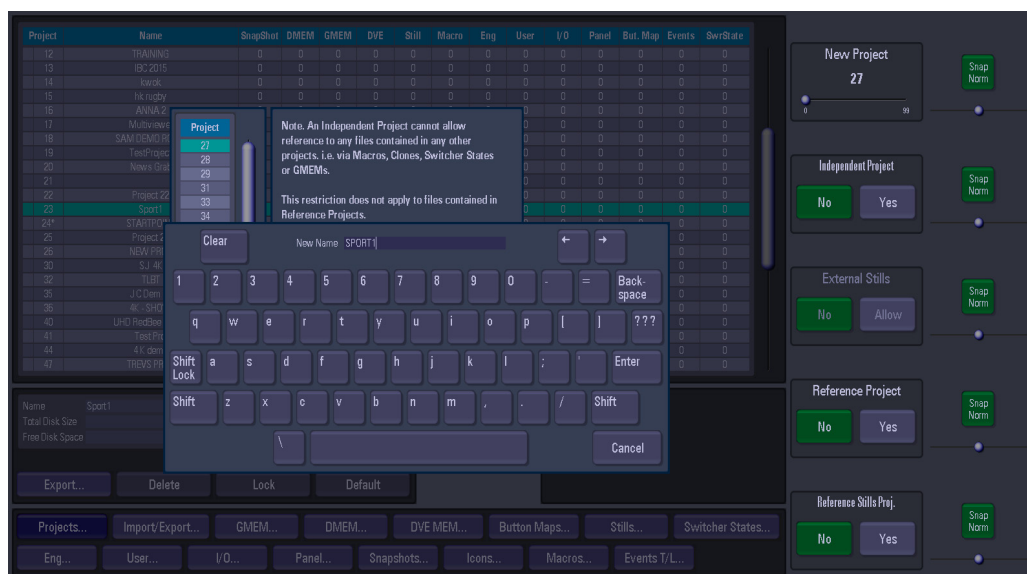
There is a column of parameter buttons on the right; Independent Project, External Stills, Reference Project and Reference Stills Project. The "Independent **Projects**" do not allow reference to any files contained in any other projects.

The restriction does not apply to files contained in "Reference **Projects"**.
When working in and Independent Project, it is not possible to write to files in other projects.
When working in an Independent Project, the highlighted parameter controls will also allow you to reference Stills/Clips, Reference Project and Reference Stills Projects.DMEM's

DMEMs and GMEMs

There are several ways to save DMEMs and GMEMs, which will be explained in full over the next few pages. Using the your large touch screen GUI, you can access the "**Load/Save Pad**" and the "**Number Pad**" via the **{SHORT CUTS}** button, under the "**System**" group of buttons.

Saving DMEMs and GMEMs using the Maverik Control Surface

With the Kahuna Maverik control surface, if you have a **MAV-KEYPAD**, you will be able to save and load GMEMs and DMEMs. You can also use the "**Load Pad**" and "**Save Pad**" menus on the MAV-GUI, as explained in the "**Kahuna Maverik Production Switcher Control Surface**" user manual, supplied with your system.

Load/Save Pad and Number Pad

At first sight, it may look strange to have two ways of saving DMEMs and GMEMs within the Short Cuts menu, but there are differences between the Load/Save Pad and the Number Pad.

The Load/Save Pad is also used to load and save DVE MEMs, Stores, Config files - Engineering, User, Panel, I/O, Events, run Timelines and adjust Effects Dissolve files, as well as load and save DMEMs and GMEMs.
The Number Pad is mainly used to load and save DMEMs and GMEMs, but can also be used to set up Effects Dissolve and run Timelines.

Load/Save Pad

Number Pad
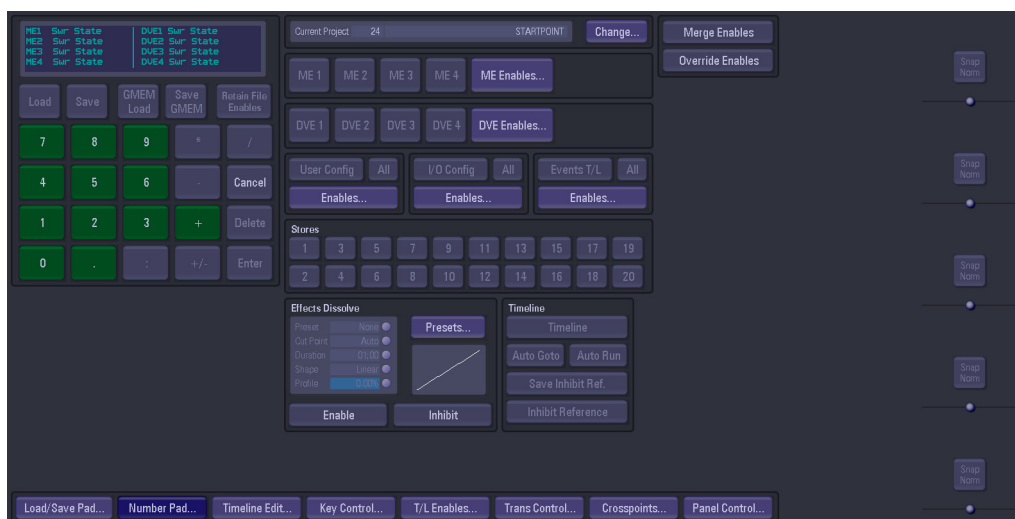
DMEMs

What is a DMEM

A DMEM or Dynamic Memory, saves the set-up information related to a single M/E, which may contain information such as:

- Bus set-up (Bgnd A, B C and D, Pgm/Pvw, Keyers, Wipes, Transitions)
- Macros and Modulation
- Color Effects (Crosspoint, Bus and Keyer)
- Key and eKey (Layer Priorities, Resize, Masks, Borders, Transition)
- Util (Modulation, Crosspoint and Color Effects)

DMEM files are Stored within a user-defined Project, the user can save up to 1000 DMEMs within a single Project.

To see the save DMEM files, touch the **{FILING SYS}** button, and then at the bottom of the menu, touch the **{DMEM...}** menu link button.

> Note: Use the "Project" parameter to make sure that you are in the correct project.

This menu allows the user to enter the DMEM filing system where the user is able to Load, Delete or Export selected DMEMs to external memory devices or use the **{Contents...}** memory link button view detailed contents within the DMEM.
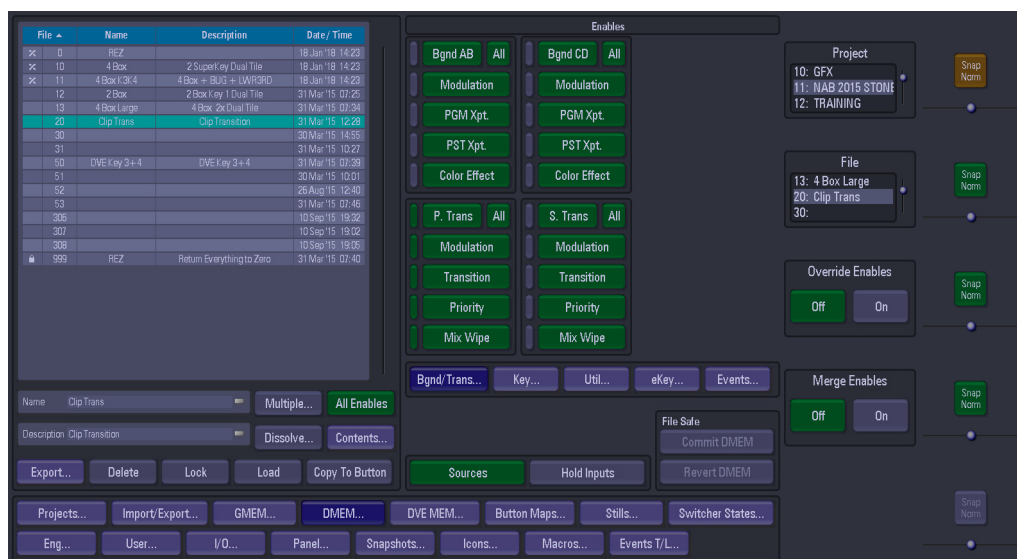
Creating a DMEM using the Load/Save Pad

To create a DMEM, touch the **{SHORT CUTS}** menu button and the "**Shortcuts - Load/Save Pad**" menu is displayed. Make sure that in the "**File Type**" column that the **{DMEM}** button is selected.

File type DMEM
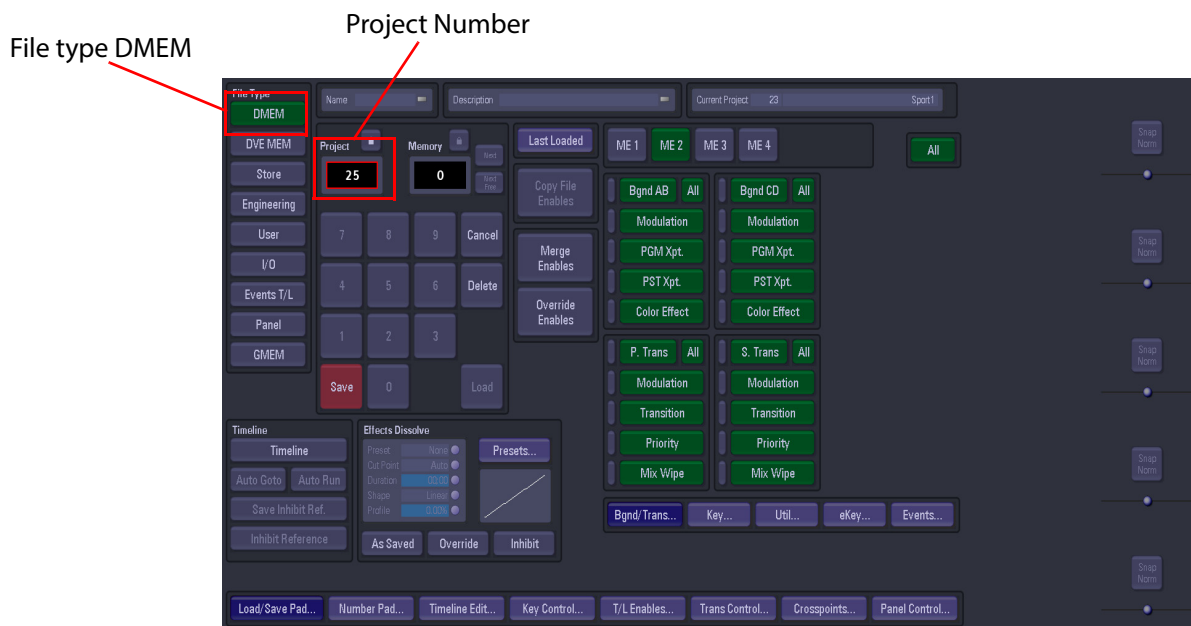
Project Number

Touch the "**Project**" number box and a red border will signify it has been selected. Use the number pad to enter the required project number.

Next, touch the "**Memory**" number box, again a red border is displayed. Use the number pad to enter the memory file number. Check that the "**M/E**" and the "**Enables**" you require are selected. Finally, touch the **{Save}** button.

> Note: Before saving the DMEM you can use the "Name" and "Description" text entry boxes to give the DMEM a name and description.
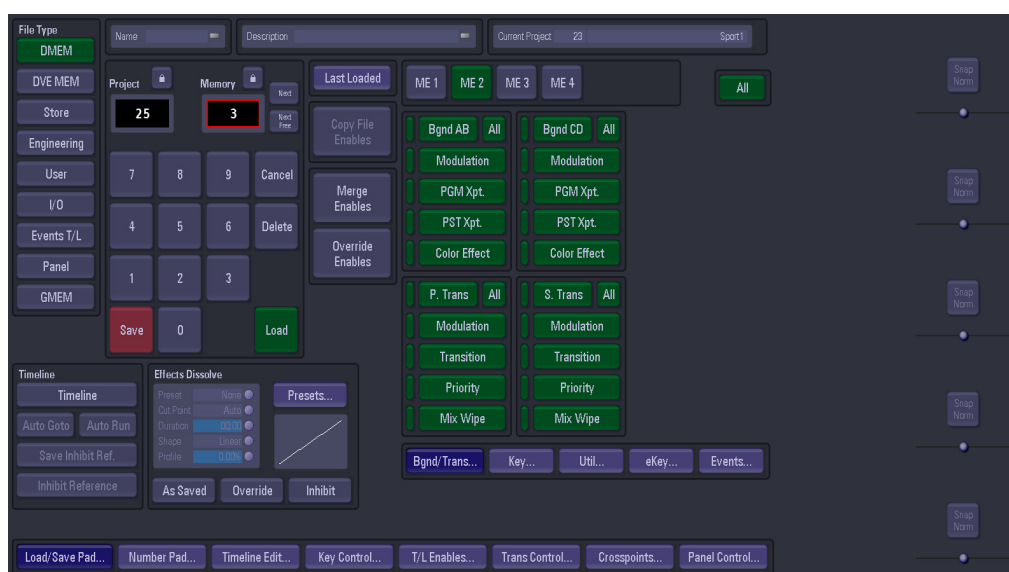
Once the DMEM has been saved, the menu will display the **{Load}** button (highlighted in green) added as shown below.

The **{Last Loaded}** button will display a list of memory files that were previously loaded, as shown below.
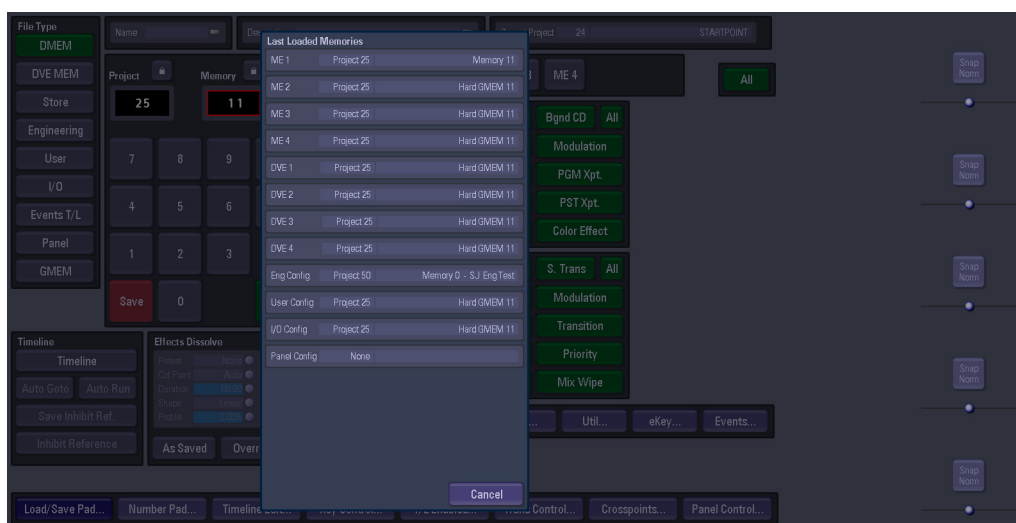
Creating a DMEM using the Number Pad

In the "**Shortcuts**" menu, touch the **{Number Pad}** button.

All DMEMs are saved into and recalled from Projects, to create a DMEM, follow the steps below.

Step 1 - Enter in the Project Number e.g. 25 followed by a **[.]** (dot), the dot signifies that a DMEM number will be entered next.
The top mnemonic display will show "**Project #25**"

Step 2 - Enter the DMEM memory position number e.g. 11.
The top mnemonic display will show "**Project #25**", next to it, the mnemonic display will show "**Memory #11**".

> Note: If you are already working in the project that you are going to save the DMEM into, you can skip entering the "Project Number [.] Effect Number".
> Just enter the "Effect Number" and then "Save".

Step 3 - Select "**ME 1**"you want to save the setup state from, e.g. pressing ME1 will save data from M/E1 (the selected button will turn GREEN).
By selecting the M/E, the display changes to show "**Project #25 Memory #11 ME: 1**".

> Note: Touching the {Cancel} button at any point before saving will cancel the entire operation.

Step 4 - Finally, touch the **{Save}** button.

If the DMEM already exists, the bottom mnemonic display will show "**File Exists Overwrite?**" touch the **{Save}** button again to save the DMEM.

Recalling a DMEM

To recall a DMEM follow the steps below.
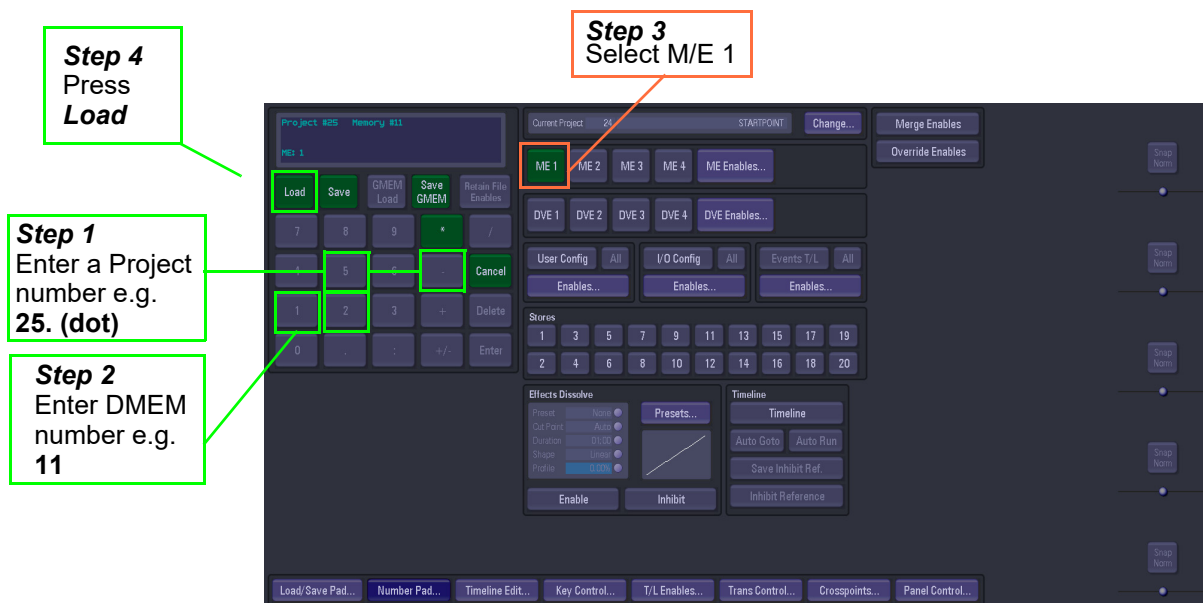
Step 1 - Enter the Project number (e.g. 25) followed by a dot **[.]**
The top mnemonic display will show "**Poject #25**"

Step 2 - Enter the DMEM memory number (e.g. 11).
The mnemonic display will show "**Memory #11**"

> Note: When operating in the Current Project that you will be recalling the DMEMs from, you can skip entering "Project Number [.] Effect Number" and instead just enter the Effect Number and **{Load}**

Step 3 - The M/E with the DMEM you want to load. The mnemonic display changes to show "**Project #25 Memory#11 ME:1**".

Step 3 - Touch **{Load}**

GMEMs

What is a GMEM

A GMEM or Global Memory will save set-up information relating to multiple M/E's (the whole control surface setup). A GMEM saves all the same information as DMEMs with the added ability to save multiple M/Es, Stores and Configurations. Example of:

- Bus set-up (Crosspoints, Keyers, Wipes, Transitions)
- DVE
- Color Effects
- Macros
- Key Layer Priorities
- Masks, Crops, Borders
- Stores
- Configs (Eng, User, Panel)

A GMEM can save all of the above as a complete snapshot of the entire system setup.

GMEMs are saved within a user-defined Project, which can be viewed in the **Filing System** menu allowing the user to enter the GMEM filing system where the user is able to Load or Delete selected GMEMs, Export GMEMs to external memory devices or view detailed contents within the GMEM.
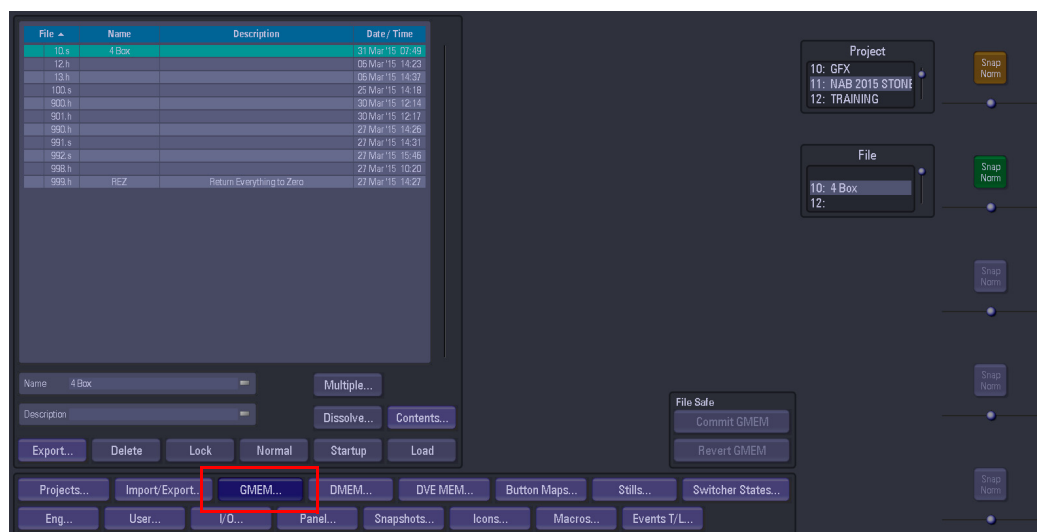
Creating a GMEM using the Load/Save Pad

Creating a GMEM is very easy and intuitive. Touch the **{Shortcuts}** menu button and the
"**Shortcuts - Load/Save Pad**" menu is displayed. Make sure that the GMEM file type is selected.

Project Number

File type GMEM
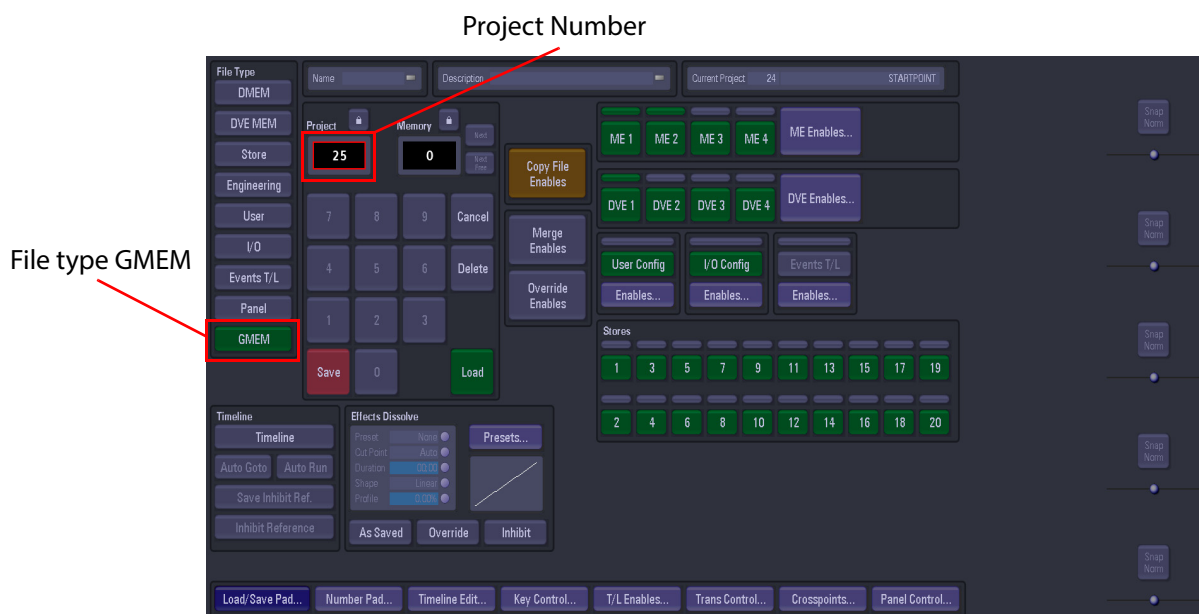
Touch the "**Project**" select box and a red border will signify it has bee selected. Use the number
pad to enter the required project number.

Next, touch the "**Memory**" select box, again a red border is displayed, use the number pad to
enter the memory file number. Select the "Stores" that you want to save in the GMEM and
check that the "**Enables**" are selected/de-selected as required. Finally, touch the **{Save}** button.

You will be asked if you want to save the GMEM as a "Hard" or "Soft" GMEM.

Hard GMEM Definition - a Hard GMEM saves whatever is created on the panel and included in
the memory as a set state.

Soft GMEM Definition - a Soft GMEM will save whatever is currently loaded and shown on the
number pad screen, so for example; the user can setup the panel in a specific configuration
and then save as a soft GMEM, but the system will not remember what was created on the
control surface, instead the system will take the information that was last physically loaded and
shown on the number pad screen, then save those settings. The user can still update a DMEM

and the Soft GMEM will remember the latest version of that DMEM as long as that DMEM was loaded on the number screen when you saved the Soft GMEM.

Soft Stills GMEM Definition - Is it the same as a Hard GMEM but only saves "links" to stills files (not the actual stills files) either from the current GMEM Project or from the Default Project, whichever is selected, keeping the GMEM file size small.

Notice that a table is also displayed showing the last loaded memories.

Once the GMEM type has been selected, touch the **{Save}** button.

Creating a GMEM using the Number Pad

Creating a GMEM is very similar to creating a DMEM.

Step 4
Press
GMEM Save

Step 1
Enter a Project
number e.g.
25. (dot)

Step 2
Enter GMEM
number e.g.
11

Step 3
Select M/E, DVE Enables,
Configs and Stores

Step 1. Enter an (existing) Project number "**25**" followed by a [.] "dot"
The top mnemonic display will show "**Project #25**"

Step 2. Enter a GMEM file number "11".
The top mnemonic display will now show "**Project #25**", next to it the mnemonic display will show "**Memory #11**"

> Note: When operating in the Current Project that you will be saving the GMEMs into, then you can skip entering "Project Number [.] Effect Number" and instead just enter the Effect (GMEM) Number and SAVE.

Step 3. At this point the user now has the choice to select M/E and DVE Enables, Stores, configurations and Event Enables (Macros) that will be saved within the GMEM. The Enable functions that you have selected will turn green.

> Note: If no Stores are selected, touch the "*" star button and all the stores will be selected.
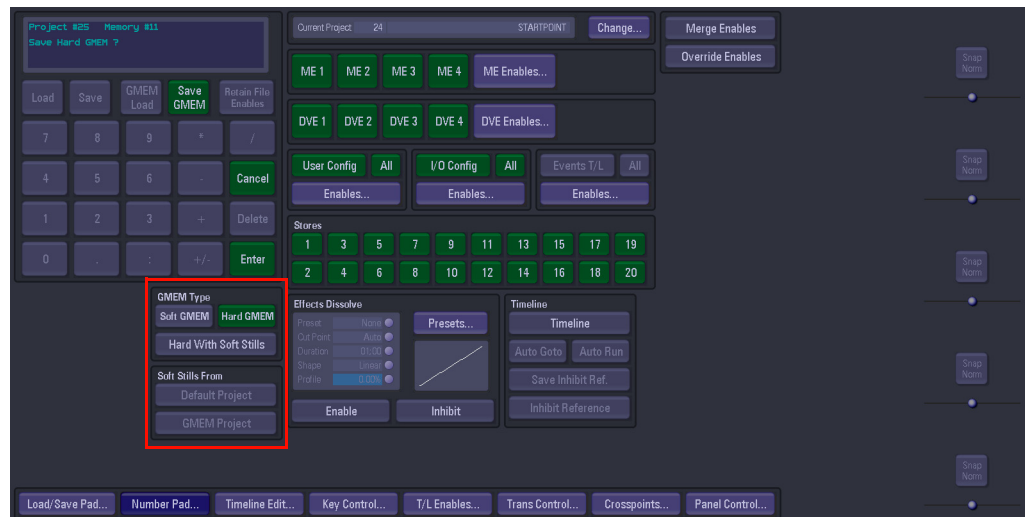
Step 4. Touch the **{GMEM Save}** button.

The option to save as a **Soft GMEM**, **Hard GMEM** or **Hard With Soft Stills** will now be displayed in a dialog box under the number pad.

Hard GMEM - will save all the Stores and M/E data in a single file, or a "Complete Snapshot".
Soft GMEM - will save "pointers" to the DMEM files and Stores.
Hard With Soft Stills - is the same as a Hard GMEM with soft stills files.

Hard GMEM Definition - a Hard GMEM saves whatever is created on the panel and included in the memory as a set state.

Soft GMEM Definition - a Soft GMEM will save whatever is currently loaded and shown on the number pad screen, so for example; the user can setup the panel in a specific configuration and then save as a soft GMEM, but the system will not remember what was created on the control surface, instead the system will take the information that was last physically loaded and shown on the number pad screen, then save those settings. The user can still update a DMEM and the Soft GMEM will remember the latest version of that DMEM as long as that DMEM was loaded on the number screen when you saved the Soft GMEM.

Soft Stills GMEM Definition - Is it the same as a Hard GMEM but only saves "links" to stills files (not the actual stills files) either from the current GMEM Project or from the Default Project, whichever is selected, keeping the GMEM file size small.

To save the GMEM touch **{Save GMEM}**.

If the file already exists you will be prompted to overwrite it - if **{Save GMEM}** is pressed a second time, the existing file will be overwritten.
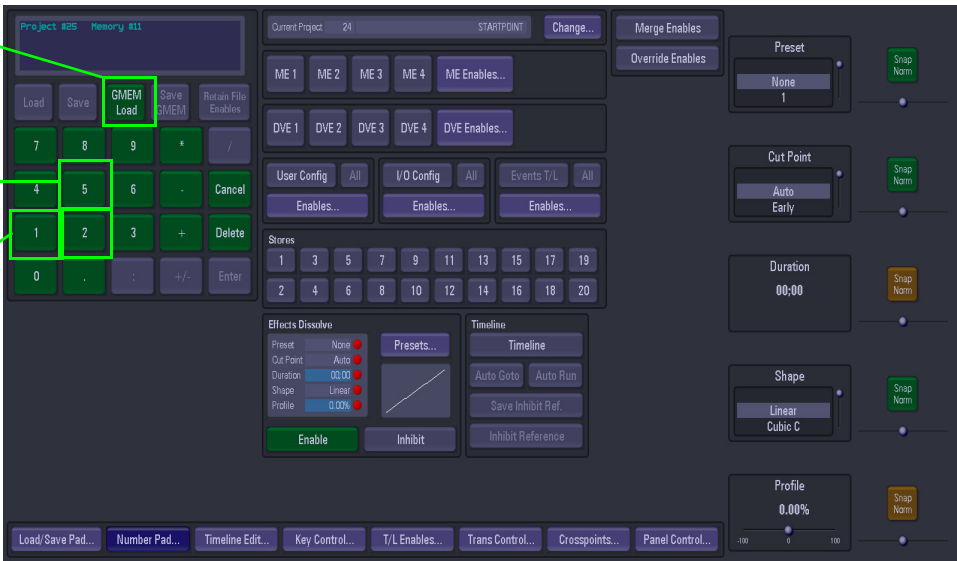
The save process may take a few seconds depending on the amount of information that is being Stored within the GMEM.

Recalling a GMEM Using the Number Pad

Step 3
Press
GMEM Load

Step 1
Enter a Project
number e.g.
25. (dot)

Step 2
Enter GMEM
number e.g.
11

Again recalling a GMEM is very similar to recalling a DMEM.

Step 1 - Enter the Project number "**25**", followed by a dot [**.**]
The top mnemonic display will show "**Project #25**"

Step 2 - Enter the GMEM memory number "**11**"
The top mnemonic display will show "**Project#25**", the mnemonic display next to it will show
"**Memory #11**"

> Note: When operating in the Current Project that you will be recalling the
> GMEMs from, then you can skip entering "Project Number [.] Effect Number"
> and instead just enter the Effect Number and LOAD

Step 3 - Finally press **{GMEM Load}**.

The GMEM may take a few seconds to load depending on the amount of information that was
Stored within the GMEM.

If you want to include/exclude some of the enables, select the enables that you want to include
by touching them the select the enables that you want to include in the recall and touch the
{Load} button.

Effects Dissolve

Effects Dissolve is a function that allows a user to create smooth transitions from one memory state to another by interpolating any variable values (i.e. size, position, border width, etc.). Any state-change variables (e.g. button pushes) can be set to change at the start or end of the dissolve. It provides for example; a very simple way of creating a two key-frame effect.

The Effects Dissolve function can be used on Global Memories (GMEM), ME Memories (DMEM), DVE Memories, and User Config. memories.

An Effects Dissolve can be applied to a Memory as it is saved using the Number Pad menu. It can also be applied to an existing Memory in the Filing System menu. It can also be activated temporarily for an individual Memory Load.

Number Pad Operation
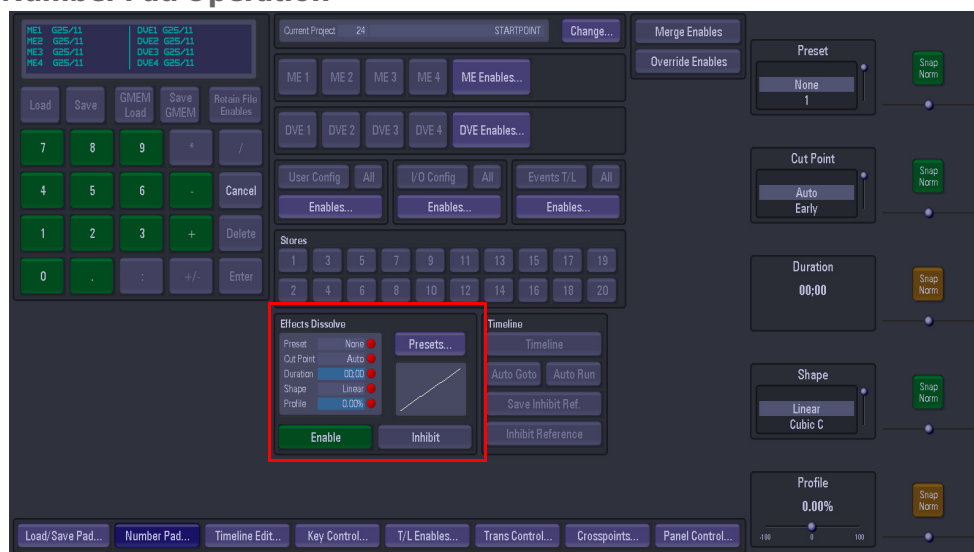
When saving a memory, a Dissolve can be applied and then recalled when the memory file is loaded. When saving a memory file, in the "Effects Dissolve" area, touch the **{Enable}** button and it will light up green. The "Effects Dissolve" attacher allows the operator to set the parameters which are applied to change the action of the Dissolve.

Dissolve Setup Parameters

Cut Point

- **Auto** - the switcher determines the most useful point for state-change variables to be changed, i.e. at the start or end of the dissolve. States which are switching on will change at the start of the dissolve and those which are switching off will change at the end of the dissolve.
- **Early** - Changes the state of all state-change variables at the start of the dissolve
- **Late** - Changes the state of all state-change variables at the end of the dissolve

Duration - Sets the overall duration of the dissolve.

Shape - Controls the shape of the chosen dissolve profile.

Profile - Sets the profile of the dissolve path allowing a linear change or smooth acceleration / deceleration (among other options). A graphical illustration of the dissolve path is shown at the bottom of the pop-up and shows the selected shape and profile.

Load Operation
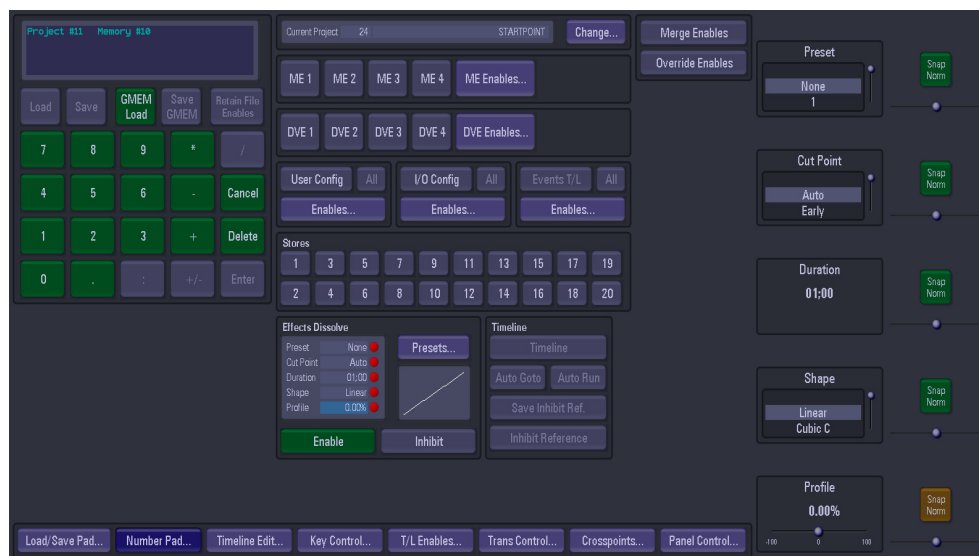
When loading a memory file which already has an Effects Dissolve applied, the switcher will automatically "Dissolve" to the new state. If a dissolve is required on a memory which has not already been set as a dissolve, this can be achieved by switching on the Dissolve button. If a Dissolve is not wanted, but the file has been saved with one, this can temporarily be inhibited during a load by touching, and holding the Dissolve button (it changes to the "alert" color).

Touch the **{Setup}** button below the **{Dissolve}** button. This will display the Dissolve Setup sub menu. This menu allows the user to override the dissolve settings for a when loading a saved memory file, without altering the values saved in the memory file.

Dissolve Setup Parameters:

As Saved - the dissolve uses the settings from the original file

Inhibit - there will be no dissolve on the next load and the switcher will make an instant change to the new state. The file will retain its original settings for future loads.

During the Effects Dissolve operation, the **Dissolve** button flashes and a progress bar moves across the MAV GUI screen. Pressing the flashing **Dissolve** button fill stop the dissolve. A progress indicator and Stop button also appear in the message box at the top of the Legacy GUI.

Dissolve Setup Parameters

Cut Point

- **Auto** - the switcher determines the most useful point for state-change variables to be changed, i.e. at the start or end of the dissolve. States which are switching on will change at the start of the dissolve and those which are switching off will change at the end of the dissolve.
- **Early** - Changes the state of all state-change variables at the start of the dissolve
- **Late** - Changes the state of all state-change variables at the end of the dissolve

Duration - Sets the overall duration of the dissolve.

Shape - Controls the shape of the chosen dissolve profile.

Profile - Sets the profile of the dissolve path allowing a linear change or smooth acceleration / deceleration (among other options). A graphical illustration of the dissolve path is shown at the bottom of the pop-up and shows the selected shape and profile.

Applying an Effects Dissolve to an existing file
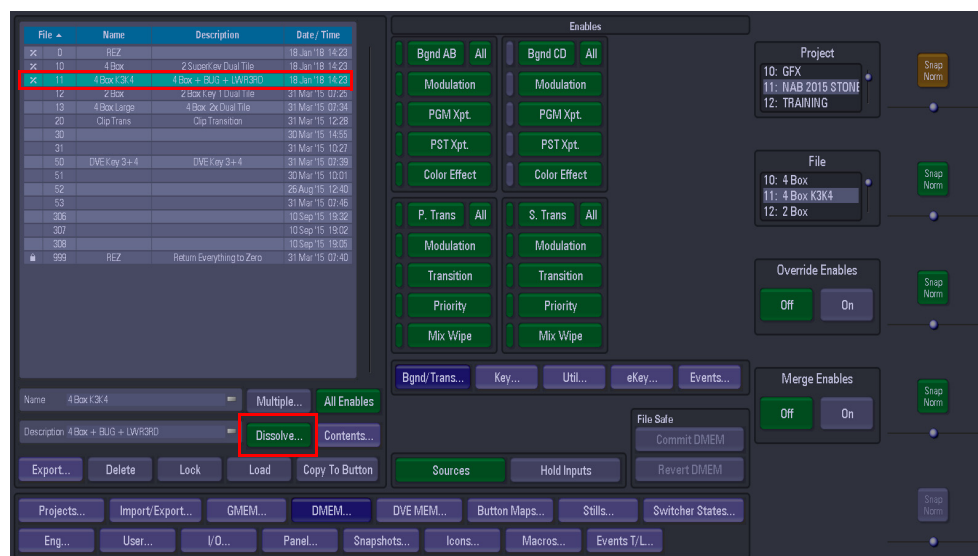
Files which have an Effects Dissolve applied to them are shown in the Filing System menu with an "**X**" icon next to the file number.

If a memory file in the list is selected, touching the **{Dissolve}** button brings up the following sub menu.
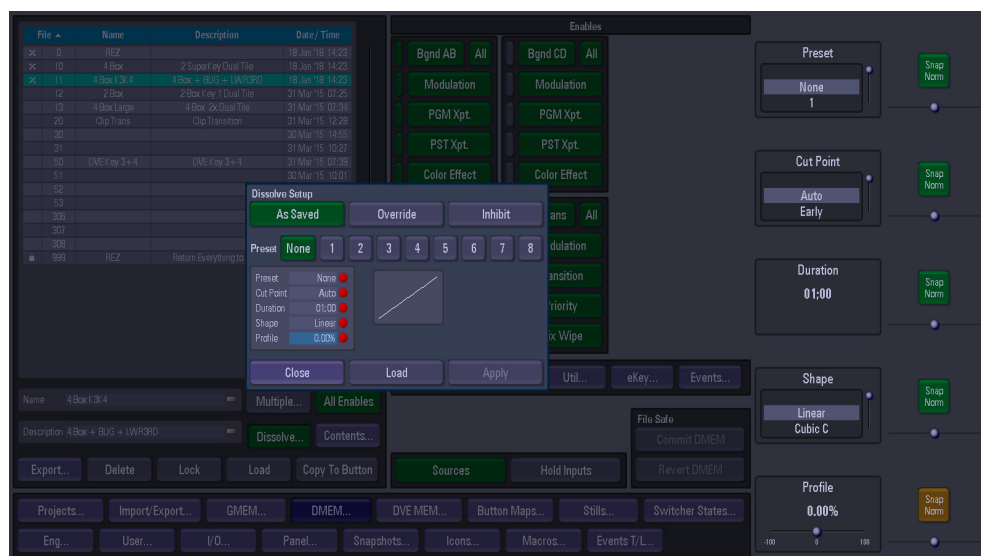
The above sub menu allows a user to apply new Effects Dissolve settings to an existing memory file.

Disabled - the file will have no Dissolve applied. Touch **{Apply}** to change the file.

Active - the file will have a Dissolve applied. Touch **{Apply}** to change the file.

Inhibit - the selected file will be loaded with all Effects Dissolve settings inhibited for the next load only using the Filing System load button.

The settings in this sub menu function in the same way as described in the Save Pad section.

Using Effects Dissolve with the Number Pad MAV module

There is a dedicated Effects Dissolve button on the top right of the number pad. This button can be selected when loading a memory in order to apply an Effects Dissolve to the load. The button will flash during an active dissolve and pushing the button will stop the dissolve.Pushing, and holding the button will inhibit the Effects Dissolve function of a memory load (the button lights in the "Alert" color).

During a dissolve operation, the progress of the dissolve is displayed on OLED "Take" button, bottom right. Any further file operation during an active dissolve will remove this figure from the display, and the button will display the file load operation in the normal manner.

Connect and Initial Setup Menus

Connect and Setup Overview

When the system has gone through the initial boot sequence, the **Connect** menu will be the first menu to appear on the GUI screen. In this menu and sub menu's the user is able to setup and configure the Kahuna system.

> Note: If the mainframe and system has previously been setup, the boot sequence may bypass this menu and go straight to the "**Connected to...**" menu. This means that the mainframe has been set as the "**Preferred Mainframe**" in the "**Defaults**" menu.

The **Switcher Login** column will show if the mainframe has been configured to work as a single switcher, or that the mainframes resources have been configured to work as multiple switchers (up to 16 individual switchers). The column will also show if other switchers are connected via a network.

> Note: If this is the first time the switcher has been powered up, the configuration will have been setup as "One Big Switcher" the user can then enter the Mainframe Configuration menus to setup the mainframe configuration as required.

Switcher Status column will have the given name of the Switcher.
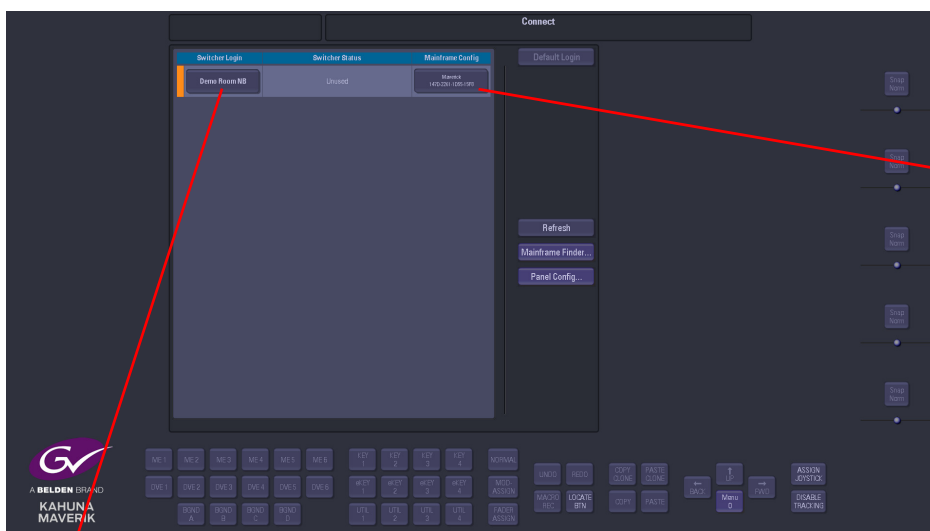
Mainframe Config button displays Name given to the mainframe. Mainframe serial number

Switcher button displays the name of the switcher/s

Touching the ***Mainframe Config*** menu button will enter the **Login as Operator** menu; where the user is able to setup and configure a selected switcher differently for each individual user.

The ***Default Login*** button allows a panel to log in "**Exclusively**" and will prevent any other panel(s) logging into that switcher. To log in exclusively, select the ***{Default Login}*** button, top right on the GUI Login.

> Note: If a panel is already logged into a switcher you cannot then log into it exclusively.

The ***Refresh*** button allows the user to refresh the display if other mainframes have been connected whilst the mainframe is being used, press the **{Refresh}** button and the system will search for any other mainframes.

Mainframe Setup Menus

Mainframe Finder

The **_Mainframe Finder_** menu, if multiple mainframes are connected to a network and the user wishes to switch from the current mainframe to a different one displayed in the list; the user is able to change the IP address allowing the user to connect to a different mainframe with their existing GUI (read the Panel Config section below).
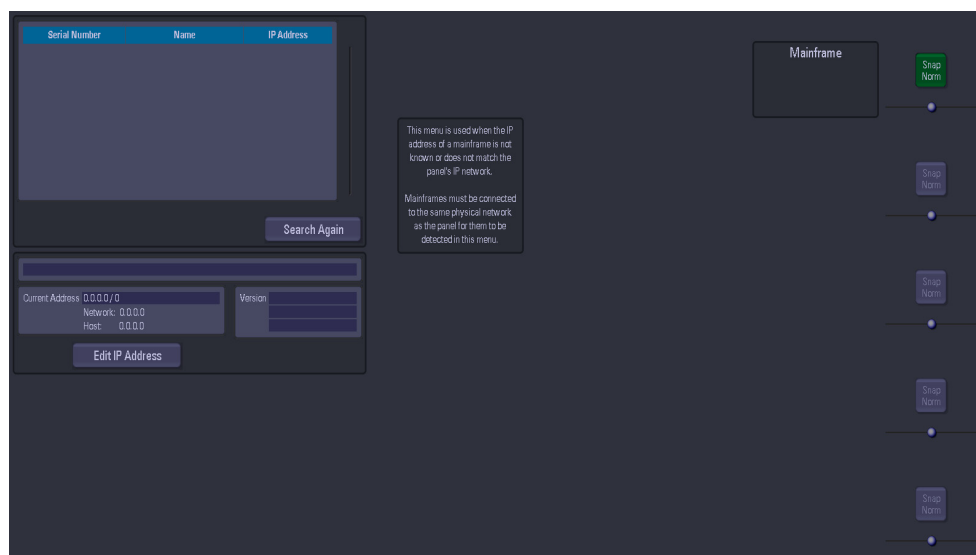
Panel Config

The **{Panel Config…}** menu will enter the Panel Configuration menu, showing the current software version, IP Address and the given Panel name as shown below.

Export - In the unlikely event that there is a problem with the Maverik control surface MAV-GUI/s, this feature allows you to export the "Panel Status" log files to a USB device. Touching the **Full Export** - the "Full Export" button will export the status of the whole Kahuna system. The information can then be sent to the Customer Support team for analysis.

Primary and Secondary Network Connection - the information displayed in these parameters allows you to see the if any network connectors are connected to the NET Fins on the Kahuna mainframe. The parameter displays whether the network connectors are in use and the status of the connection.

> Note: Network connections to the "Secondary Network Connector" will only be displayed if the mainframe is a Kahuna 9600 with a second Router Card and NET Fin.

IP Mainframes

The **{IP Mainframes}** menu is used to connect to other mainframes on a different network. If a mainframe is on a different VLAN or on a totally different network, the user has to know the **"Outgoing Gateway"** of the facility they are working in, the **"IP address"** of the mainframe they wish to connect to, and the **"Return Path Gateway"** from the other network. All these parameters have to be entered before being able to connect to the mainframe.
To add the IP addresses, touch the "**Edit**" button and an "**IP Address**" keypad will be displayed. Once all the information has been added, touch the "**Add IP Network"** button. If the information is correct, the Kahuna mainframe IP address is shown in the menu.
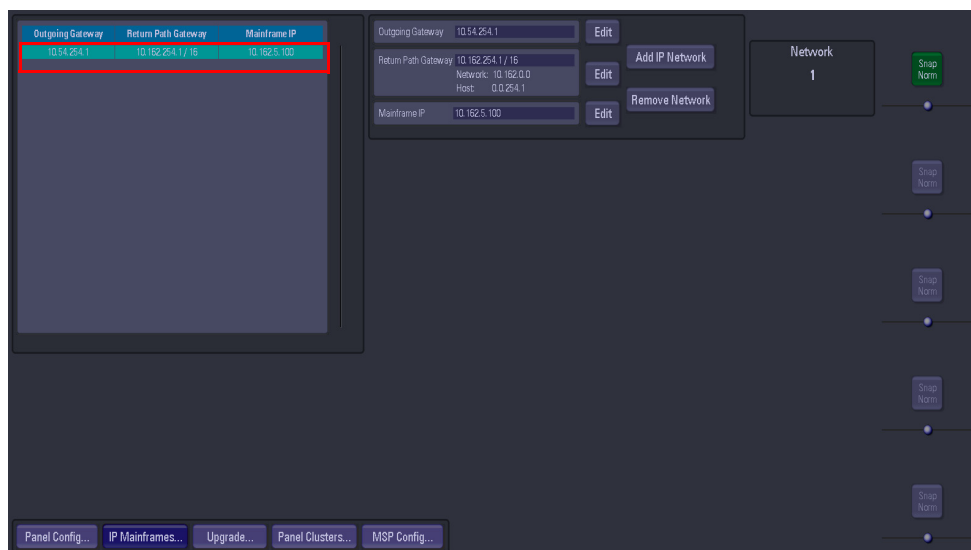
Upgrade

The software for the panel is usually upgraded when the mainframe software is upgraded in the **Mainframe Configuration - Upgrade** menu, but using the **Panel Configuration - Upgrade** menu, the user is also able to upgrade just the Panel software allowing the panel to be used with a mainframe that is running a different version of software, that is on the same network.
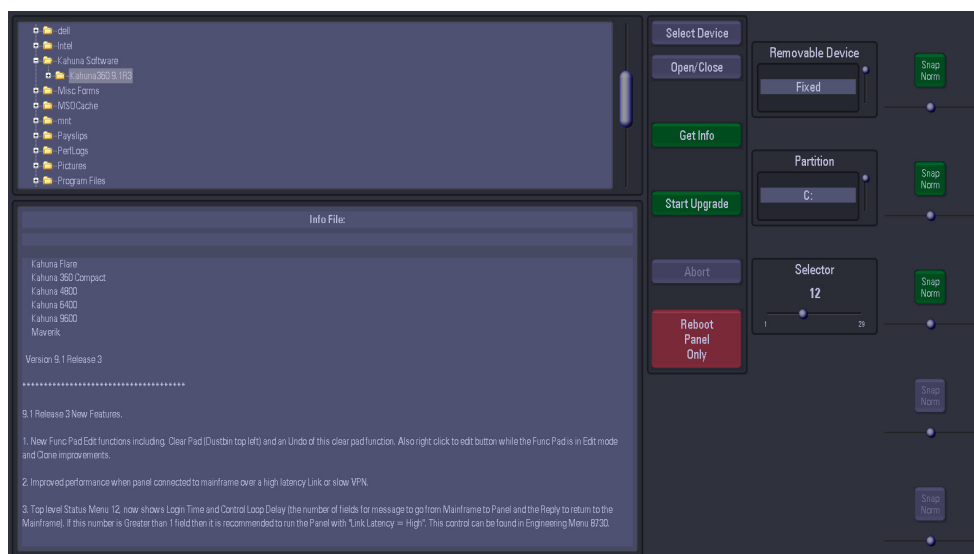
Touch the **{Upgrade...}** button to enter the **Panel Upgrade From USB** menu, this menu works in exactly the same way as the **Mainframe & Panel Upgrade** menu, where the user inserts a USB memory device into one of the USB ports on the GUI, then press the **{Select Device}**

button, all the information on the memory device will be displayed as a filing system top left of the screen, multiple versions of software can be stored on the memory device, so the user needs to select the required version using the **_Selector_** parameter control.

Next touch the **{Get Info}** button and information related to the selected software from the.txt file will be displayed in the information area. When happy that the correct software has been selected, press the **{Start Upgrade}** button.
The software will take a few minutes to upgrade the panel, when finished press the **{Reboot Panel Only}** button. The panel software upgrade is now complete.

> Note: If the mainframe is connected to a network of switchers, any switcher mainframes that have a different version of software to the GUI (Panel) then the mainframes shown on the network will be Red as shown below.

Touching one of the red mainframes will display a dialog box asking the user if they wish to upgrade/downgrade the GUI software to the version of software being used on the selected mainframe. In the dialog box options, if **"Upgrade Panel from Mainframe"** is selected then only the GUI software will be upgraded. When finished the user will be prompted to **"Reboot the Panel only"**.

Panel Cluster

The Panel Cluster menu is used to cluster all the MAV-GUIs in a Maverik control surface together so that they are "aware" of each other and can work together. Each cluster has to be unique to the Maverik control surface the MAV-GUIs are attached to. To setup the MAV-GUIs in the same cluster, press the **{Panel Config}** button shown on the previous page to display the **Panel Configuration** menu, and then press the **{Panel Clusters...}** menu link button.
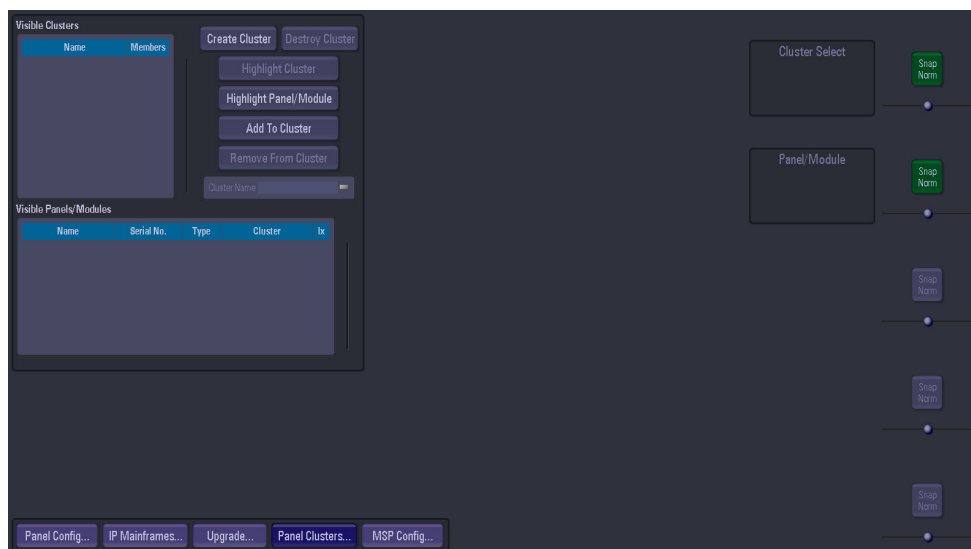
The **Multi-Panel Clusters** menu will then be displayed as shown below.
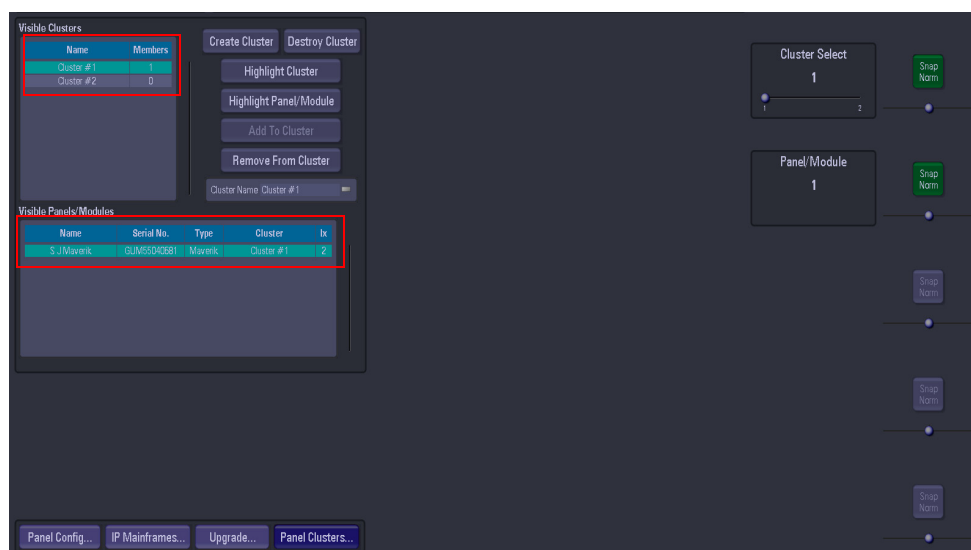
The MAV-GUI or MAV-GUIs and the GUI when connected to the mainframe are displayed in the "**Visible Panels/Modules**" table (highlighted in red above).

The first step in this menu is to **Create a Cluster,** press the **{Create Cluster}** button and a new row will be added to the "**Visible Clusters**" table. Then use the **Cluster Name** box to give the cluster a name (in this example, "Validation" shown above) touch the red oblong twice to open the on-screen keyboard.

The MAV-GUI or MAV-GUIs now have to be given the same cluster name, use the USB keyboard plugged into the MAV-GUI to give the GUI the same cluster name (in this example "Maverik").

The MAV-GUI/s and GUIs need to be added to the cluster, touch one of the required MAV-GUIs or GUI in the "Visible Panels/Modules table and then press the **{Add to Cluster}** button, then do the same for all the MAV-GUIs/GUIs. The number of GUIs added to the cluster can be seen next to the cluster name in the "Visible Clusters" table.

The Cluster Index number should already be set. If the "Cluster Index" number needs to be changed, touch the "New Cluster Index" parameter and the rotary control attacher will light up, use the rotary control to set a new number, then press the **{Apply New Index}** button.

MSP Config

KahunaMSP is an application software option for Kahuna. Once the software is installed, it allows you to run a soft version of the Kahuna MLC GUI, MAV-GUI and Maverik Control Surface on a Windows^TM based computer.

- Control any Virtual ME of an attached Switcher Frame, regardless of Frame size.
- The Make ME feature allows MSP to control its own show or collaborate with the main switcher on a single production.
- Familiar interface and easy transition to KahunaMSP software, which runs on a user-supplied standard PC.
- The MSP software is included with the switcher application software.
- Purchasing the option provides a software license that enables the interface in the Video Processor Frame.

A license file enables users to access an unlimited number of applications associated with a video processor frame.

Please contact your supplier or Grass Valley customer service representative for further details.

Login as Administrator

Note: If no administrator accounts have been setup, i.e. if this is the first time the mainframe has been powered up, this menu will be bypassed and the first menu to appear will be the Mainframe Configuration menu.
Once the mainframe has been setup and administrator accounts have been created, only **Engineer Administrator** accounts will be able to access the Mainframe Configuration menus.

Touching the "Mainframe Config" button may display this menu, prompting the user to log into the Mainframe Config main menu.
User accounts in this menu are setup in the **Eng Config - Access Control** menu (which will be described in detail in the Engineering Configuration section in this manual).
Access to the following menus is given to users with "Full Engineer Access Control Rights" only.
Access to the configuration setup menu's for each administrator can also be pin number protected if required.
Touching one of the icons will take the user to a set of sub menus which allow the user to setup and configure the mainframe.

The menu also displays the Mainframe, and Switcher that the user selected.
A unique graphic or picture can be placed in the icon in the **Access Control** menu.
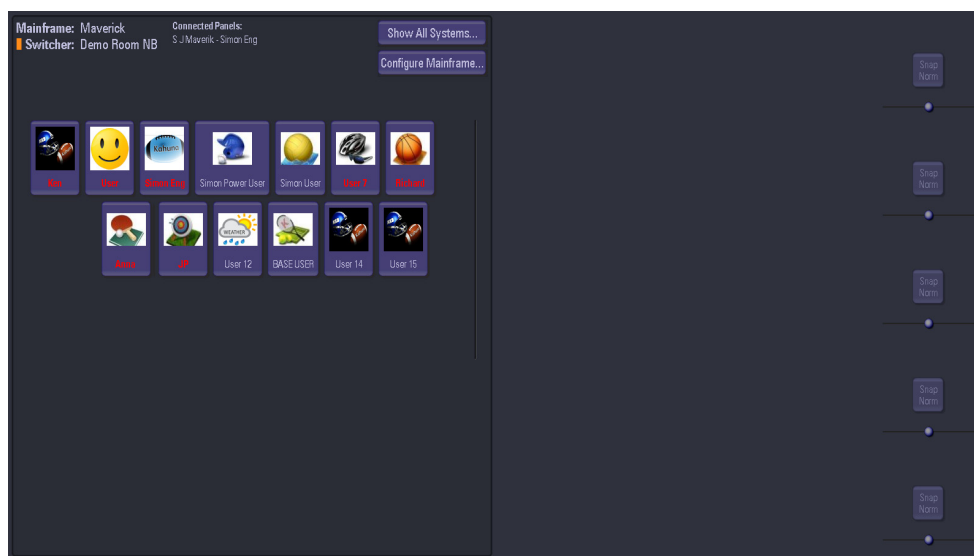
Touching one of the icons will take the user to the **Mainframe Configuration** menu.

The **{Show All Switchers...}** menu will revert back to the **"Connect"** menu.

Mainframe Configuration (predefined mainframe configurations)

The Mainframe Configuration menu displays any Predefined Configs, which are predefined mainframe configurations that have been previously setup. The user can select a pre defined configuration and then enter the other menus to setup the selected mainframe configuration.

Creation of the predefined switcher configurations is done in the Switcher Config menu (see the center button at the bottom of this menu)
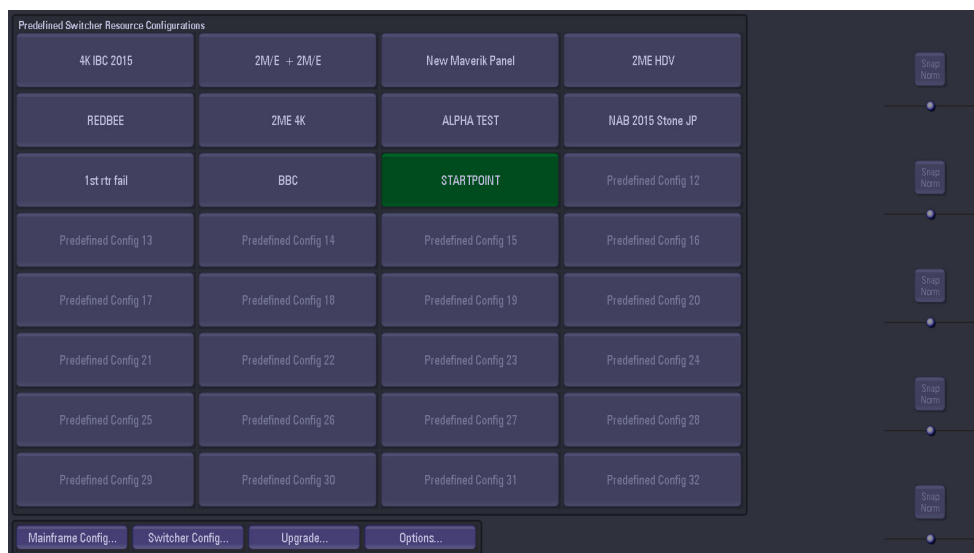
At the bottom of the menu press the **{Mainframe Config...}** button.

Mainframe Configuration

This menu displays the current version of software the mainframe is running, the current IP address, and the user is also able to give the mainframe a unique name.
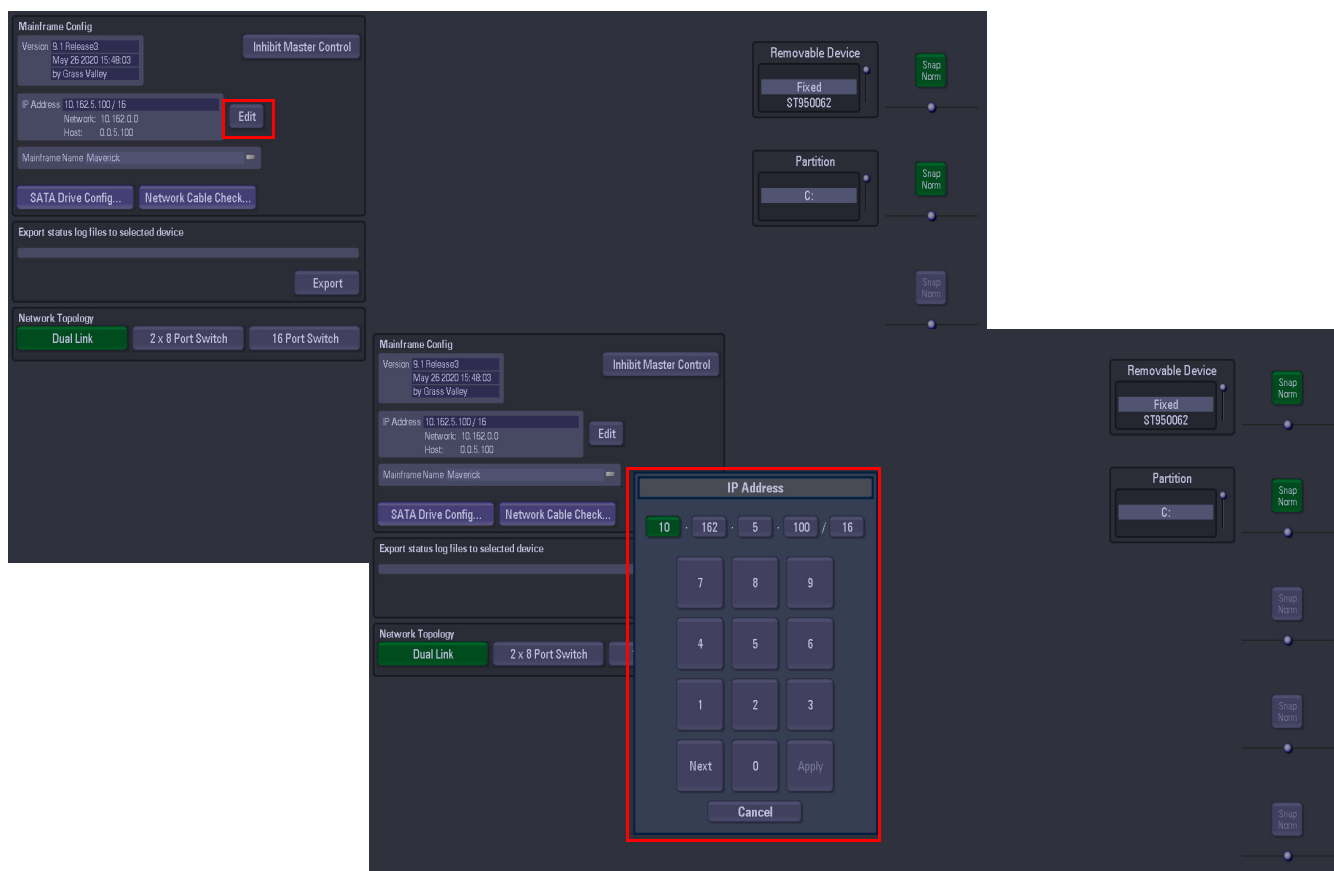
A new IP Address can be given to the mainframe by touching the **{Edit}** button and entering the new address using on-screen number pad, then finally pressing the **{Apply}** button. The **{Inhibit Master Control}** button will stop the mainframe from using the "Shadow Switcher" function.

SATA Drive Configuration

The Kahuna mainframe has SATA hard drives installed in the Control Cards (shown as RTR 1 and RTR 2) in the menu below, depending on the system setup, the mainframe may contain 2 SATA hard drives (RTR 1) or 4 SATA hard drives (RTR 1 and RTR 2).

Two of the SATA drives (RTR 1) are the System drives containing saved information such as Projects and Stills/Clips, its status in the menu is displayed as "K360 System RAID", the two SATA drives work together as a RAID pair; allowing faster access to information on the drives.

Kahuna is capable of using a single drive as the mainframe's system disk, although the usual configuration is to RAID a pair of drives together for speed and redundancy. The location of the system drive or drive pair is not important. Any of the six possible locations can be used (2 on each RTR card and 2 external eSATA drives). By default, the system drives are the ones labeled RTR 1 (Upper/Lower), but users may wish to configure one system drive on each of the two router cards, the advantage of this is that if RTR 1 fails, the control card can be unplugged and the system will continue to use the disk on RTR 2.

The hard drives can be in one of four states -

- Unallocated
- Independent K360 Disk
- RAIDed K360 disk
- DOS (FAT32) formatted.

The disks can be converted between these states in this **SATA Drive Configuration** menu. In addition, one independent K360 disk or one RAID'ed pair of disks are marked as the system drive for the mainframe.

An Unallocated drive is one that has not got either a DOS file system or our native SWNFS file system on it. A drive that has been DOS FAT32 formatted can be used in the same way as USB drives, they will appear in the list of devices on the Import and Export menus. Since SATA is faster than USB, this is a better way to transfer large amounts of data from one Kahuna to another. The **Filing System - Import/Export - Manage Media** menu can be used to partition and reformat a DOS disk.
A drive that is configured as an independent K360 disk can have another unallocated drive paired with it to form a RAID. A pair of drives that are configured as a K360 RAID can be split into two independent K360 drives. If the RAID had been the system drive, one of the new independent drives will become the new system drive.

Note: Converting a drive to the unallocated state will loose ALL data on the drive.
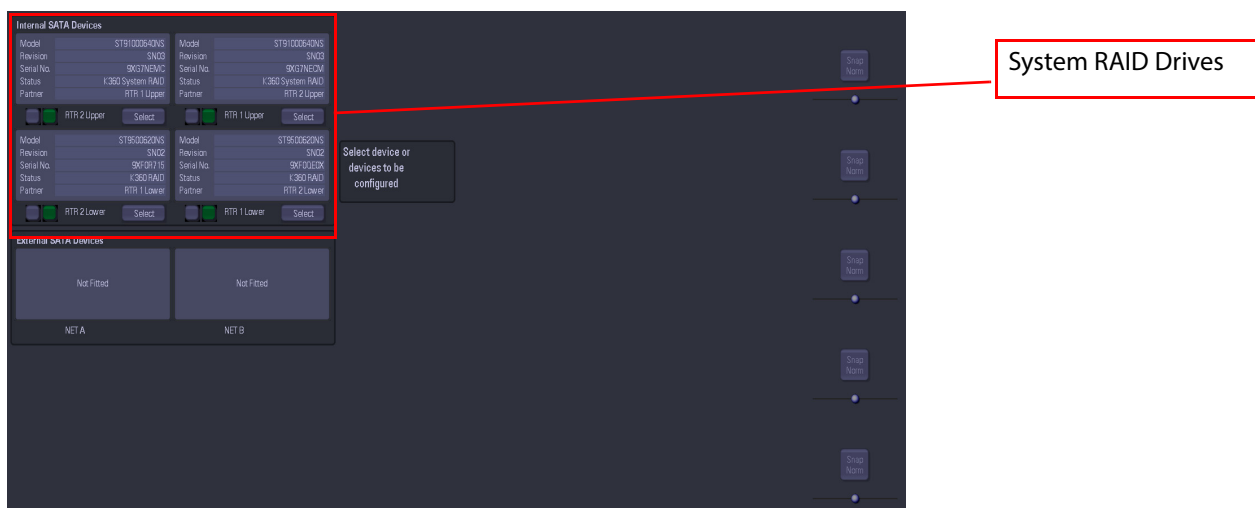
System RAID Drives

Note: Unless an issue has occurred with the Kahuna System RAID drives, they should not be configured.

IMPORTANT:
If you attempt to configure the System RAID Disks a warning will appear!
If you touch "OK" you will loose all information including Projects, GMEM's, DMEM's, Stills etc. on the System RAID Disks
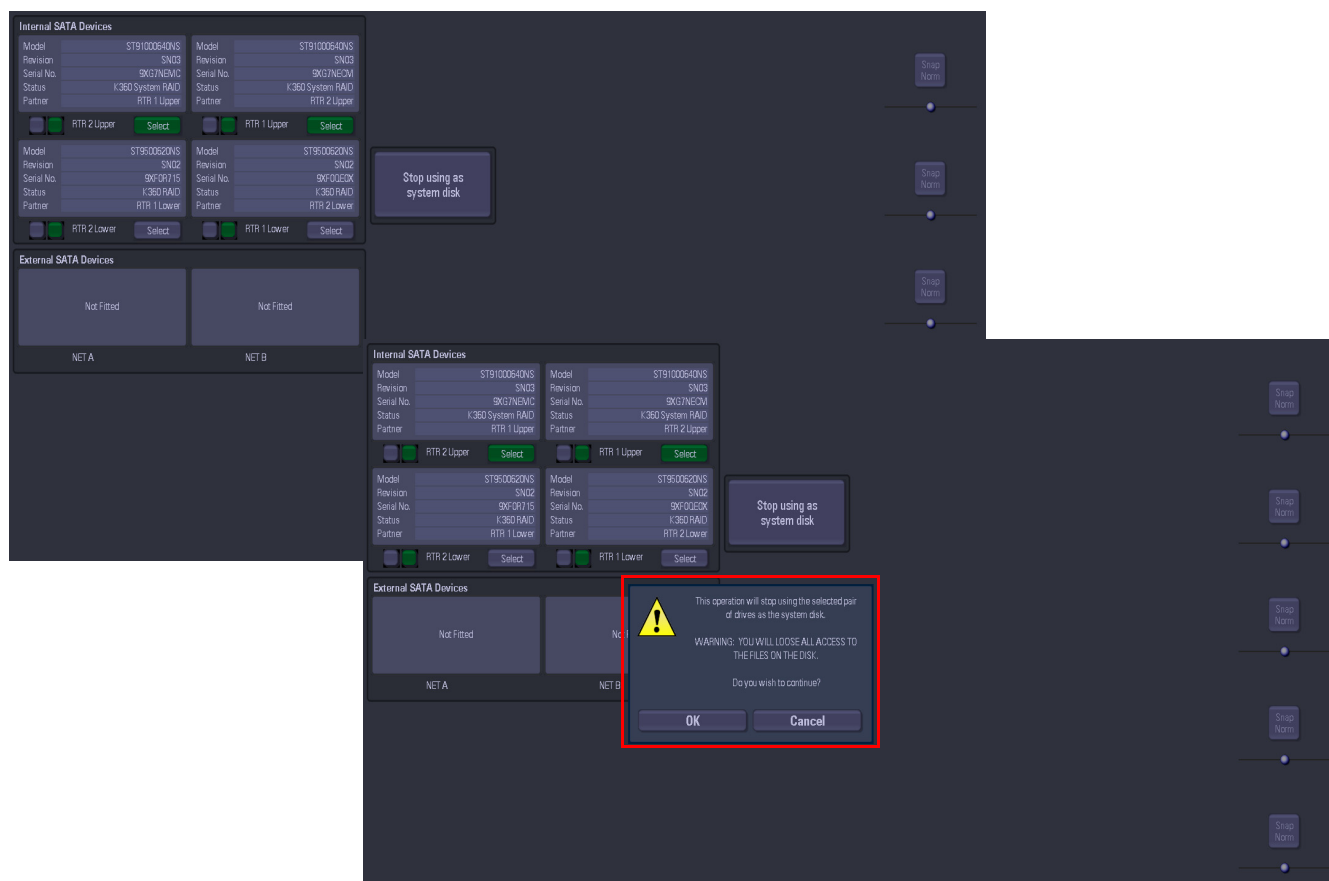
Note: If one Kahuna System RAID SATA drive is removed, the system will still function as normal but access to information will be slower.

Hard Disk Setup Options

Depending on the individual status of the hard disk drives, pressing the **{Select}** button in the menu below the drive will display setup option buttons for the drives.

If a single "unallocated" drive is selected, the user is given buttons to convert the unallocated drive to either a DOS disk or to an independent K360 disk.

> Note: Formatting for DOS can take approximately 90 seconds per terabyte to complete.

If a pair of unallocated drives is selected, the user is given a button to convert them to a RAID pair. This is the fastest configuration.
If an independent K360 disk is selected, and an unallocated disk selected, the user is given a buttons to convert them to a RAID pair.

> Note: Warning! This may take hours to bring the drives into sync.

If a DOS disk is selected, the user is given a button to convert it back to unallocated. If an Independent K360 disk is selected, it can be convert it back to Unallocated status. Also, if the drive is not already allocated as a System Drive, it can be converted to become the System Drive.
If both drives of a RAID pair are selected, the disk drives can be split into two independent K360 disks. Also, if they are not allocated as the System Drive, the user is able to convert them to be the System Drive.
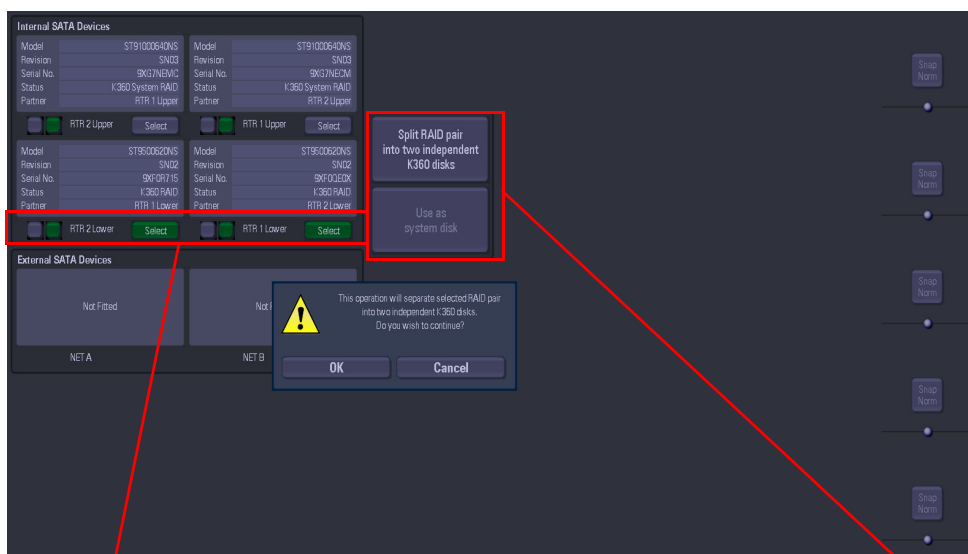
Touch these buttons to select the drive

A dialog box/button will appear with "Convert unallocated drive to independent K360 disk"

> Note: Backup of the SATA drives id done in the **Filing System - Import/Export** menu.

The RAID

The K360 RAID works by writing everything to both drives. When reading, the load is shared between the drives, effectively nearly doubling the read speed. If one drive in the RAID pair is not present, and the other drive is written to, when the missing drive is found, the system will bring the two drives back into sync.

While the sync operation is in progress, performance will be reduced. The red and green drive lights will flash and the SATA drive config menu will show the status as **_Repairing_**.

If data has been written to one drive without the other and vice versa, the system has no way to know which drive to copy to which, so it doesn't mount either. The user will have to manually reconfigure one to be unallocated, then pair it with the other drive and let it bring the whole process back into sync.

Connecting External SATA Drives

External SATA drives can be connected to the mainframe at the rear, the connectors are on the Network Fins (see Mainframe Connections section of this manual). When connected, they will be displayed in the External SATA Devices are of the menu as shown below.

External Drives can also be configured to be used as backup drives like the internal SATA drives, or used to import or export files.
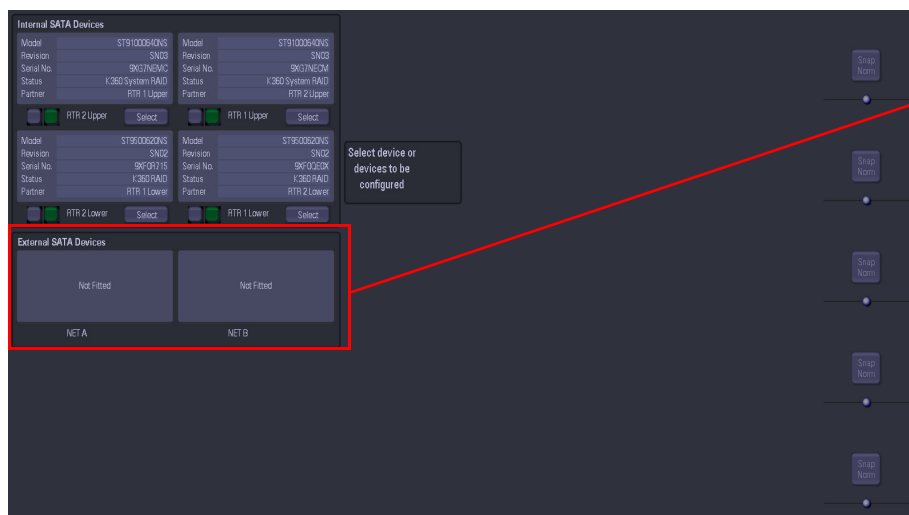
External drives displayed here

Network Cable Check

The Network Cable Check menu is a quick visual check of the network cables that are connected to one of the 16 network ports on the Net Fins at the back of the Kahuna mainframe.

On entering the menu, the menu will update for a few seconds then display the status of all network cables connected to the mainframe.

As can be seen in the menu above, a cable is connected to Net Card A, Port 2. The menu displays 4 "Lengths" of cable "A - D" each length is 50 meters. The table also displays the "Status" for each length of cable.
If the table displays "Short" or "Open" for a connected cable, a possible problem will occur for example; with the connection between the MAV-GUI and the mainframe.

Export

Export Status Log Files – in the unlikely event that the system should fail in any way, this function allows critical data relating to the possible problem, to be down loaded onto a USB memory device in the form of a (.txt) file. Place the memory device into one of the USB ports, select the memory device using the **"Removable Device"** parameter and then touch the **{Export}** button.
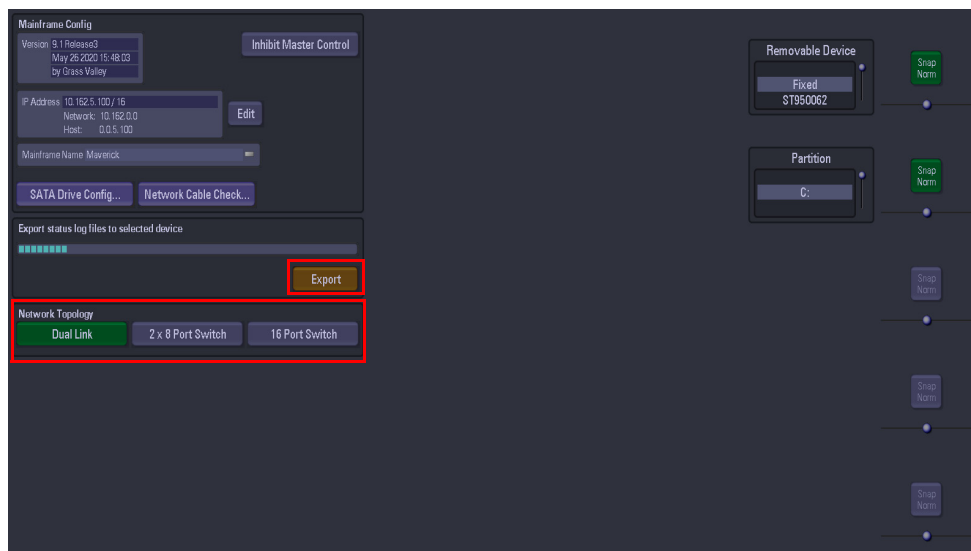
If the memory device is partitioned, select the partition that the log files are to be stored in and finally press the **{Export}** button.

Network Topology

Network Topology allows the user to select the way they want to work with the Net Fins.

Dual Link - This allows the user to connect an Ethernet switch to the system on "Both Net Fins" and effectively give dual Ethernet redundancy (i.e. the user can now connect the Ethernet switch to the panel.

2x 8 Port Switch - Single mode, each 8 port Net Fin works independently. Do not connect a Network Switch across the two Net Fins.

> Note: **Caution** - Do not connect two MAV-GUIs in a cluster across the two separate Net Fins.

16 Port Switch - Connects the two 8 port Net Fins together internally, as if they are now a single 16Port Switch. The user can now connect MAV-GUIs etc. in the same cluster on either Net Fin (i.e. MAV-GUI 1 on Net Fin A and MAV-GUI 2 on Net Fin B).

> Note: **Caution** - Do not create Ethernet loops e.g. Do not connect both Net Fins to a single Ethernet Switch.

Switcher Config

In the Mainframe Configuration menu, touch the **{Switcher Config...}** button and the first menu to appear is the Configuration Summary menu.

This menu displays all 16 switcher configurations and all the resources allocated to each logical switcher.
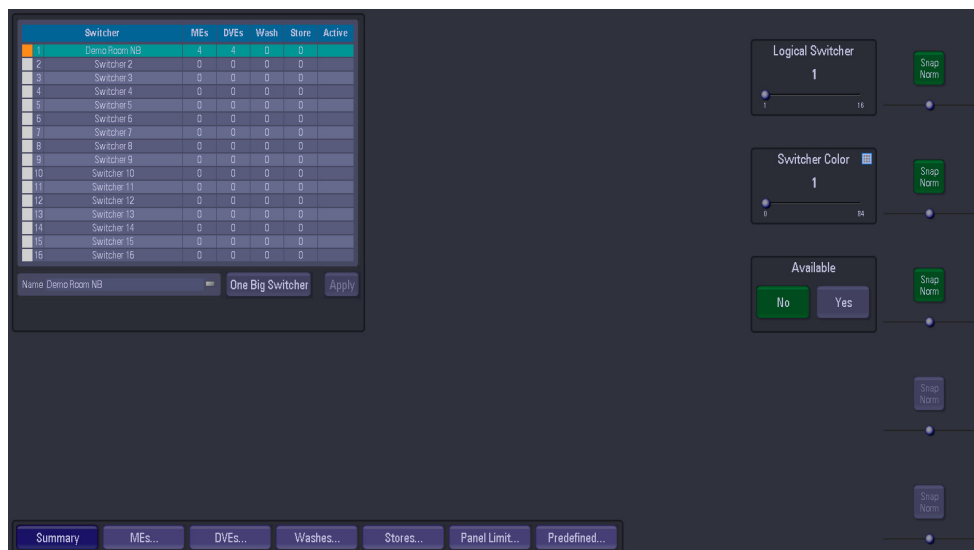
The resources allocated to each individual switcher are shown in the columns, and the Name attacher can be used to give each switcher a name.
A unique color code can be used to identify a switcher by using the Logical Switcher parameter to select a logical switcher in the table, then touch the "**Switcher Color**" parameter pop-up to select a color options.
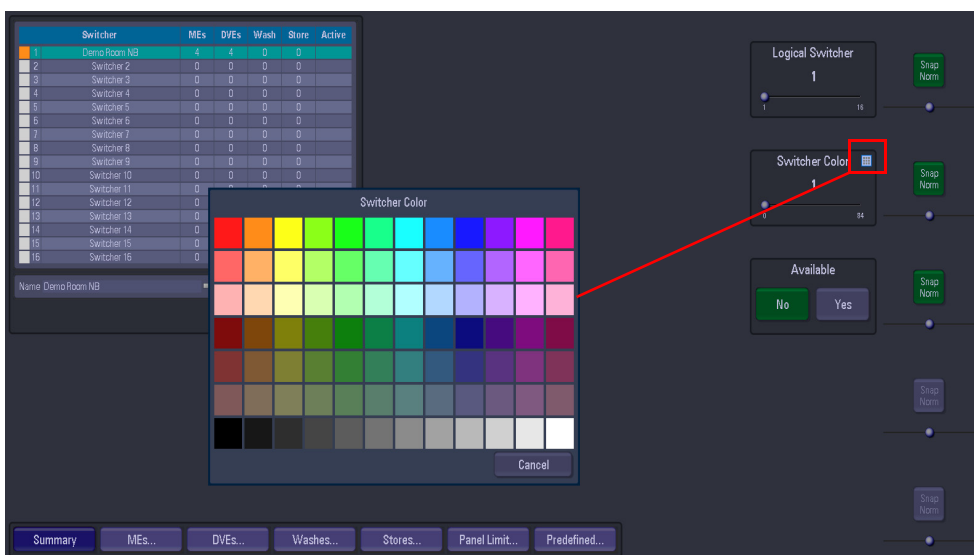
The selected color will also be displayed next to the switcher login button in the **Connect** menu and when logged into the switcher the color assigned to the logical switcher is displayed top right of every menu. The logical switcher can also be named using the "**Name**" parameter box, when finished, touch the **{Apply}** button.

All the switchers in the table can be forced to make one logical switcher by pressing the **{One Big Switcher}** button, this will force all the resources into one switcher. Caution is needed when using this function as all other switcher setups will be lost, after pressing the button a caution dialog box will appear, if the user wishes to continue press **{OK}**.

MEs and Make ME^{TM}

The MEs menu is one of the most important and defining menus when setting up a Kahuna mainframe. This is where all the resources are assigned to the logical switchers using Kahuna's unique **Make ME^{TM}** technology.

The column showing the 16 logical switchers displays the quantity of M/E's each logical switcher has been allocated. The second column in the menu identifies the M/E's are assigned and shared on the M/E cards.

M/E's allocated to each logical switcher

M/E's shared on M/E cards
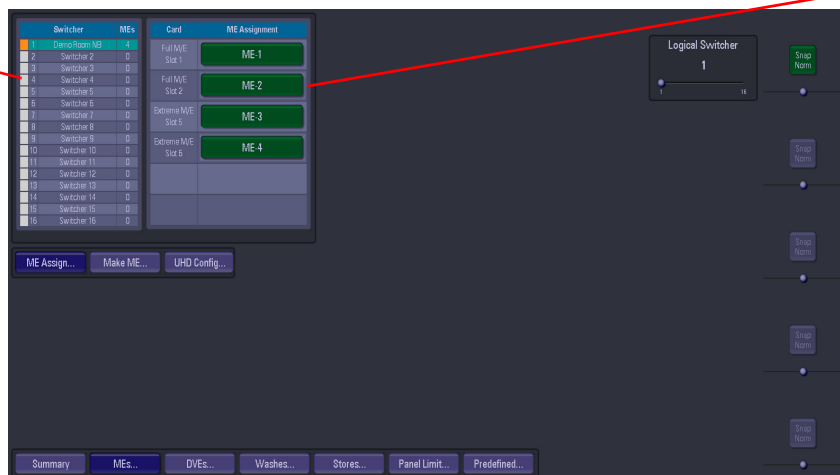
The M/E Assignment column will display the M/E's in Green if the M/E's are active, touching the M/E buttons can cause 3 different states:

• **ON** - green button as shown above

• **OFF** - the button turns Gray

Resources Displayed - touch an active M/E and a resources box will be displayed for a few seconds to the right.
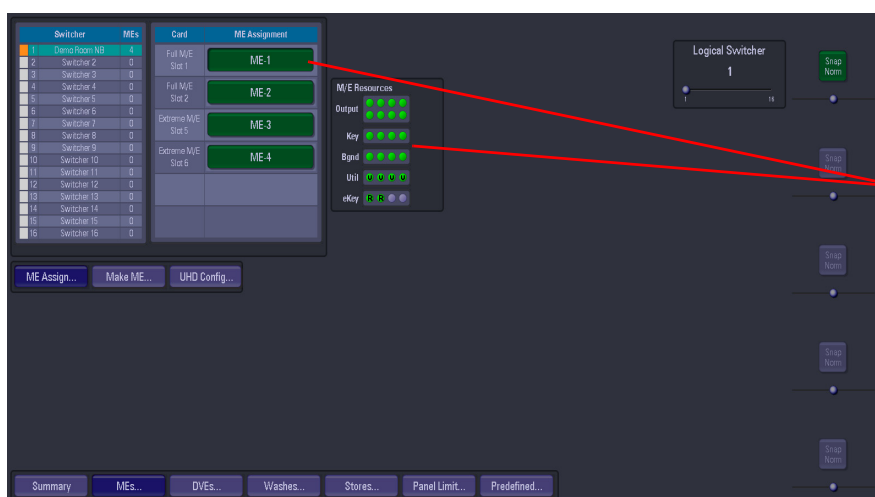
Touch an M/E in the Assignment column and the Resources are displayed

As mentioned earlier the user can touch the M/E allocation buttons to turn the M/E's On and Off, turning them Off in one logical switcher will allow the M/E to be allocated to a different logical switcher as shown below:
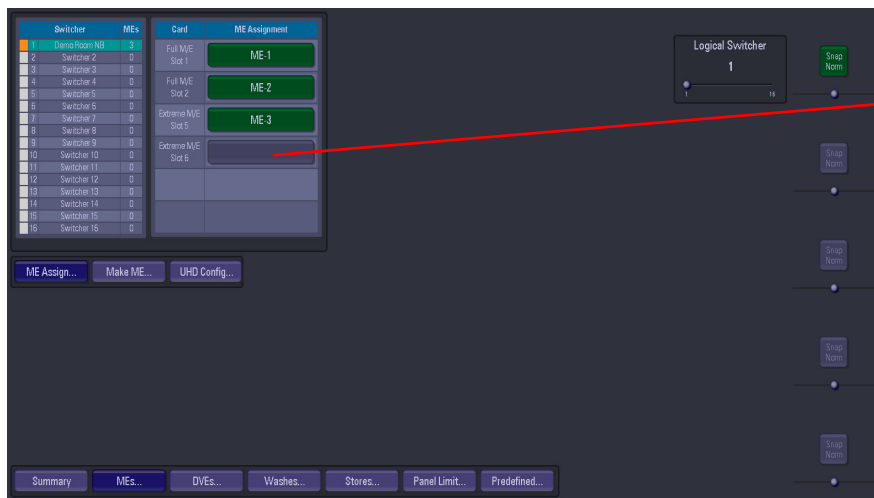
M/E's turned Off to allocate to a different Logical Switcher

Select a different logical switcher in the table and touch the **{ME Assign...}** button. You will notice that in this example three of the M/Es are grayed out with crosses in them; these are not selectable, but the fourth M/E can be selected and assigned to the second logical switcher as shown below.
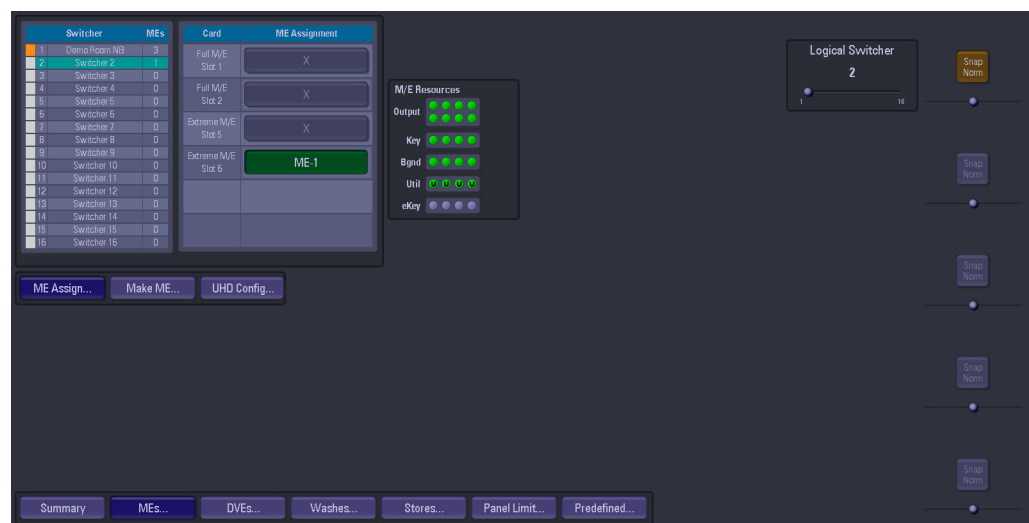
Allocating M/E Resources

Touch the **{Make ME...}** button and the "**Make ME**" menu will open, this is where the user can allocate resources on each M/E card to create a single M/E or multiple M/E's.
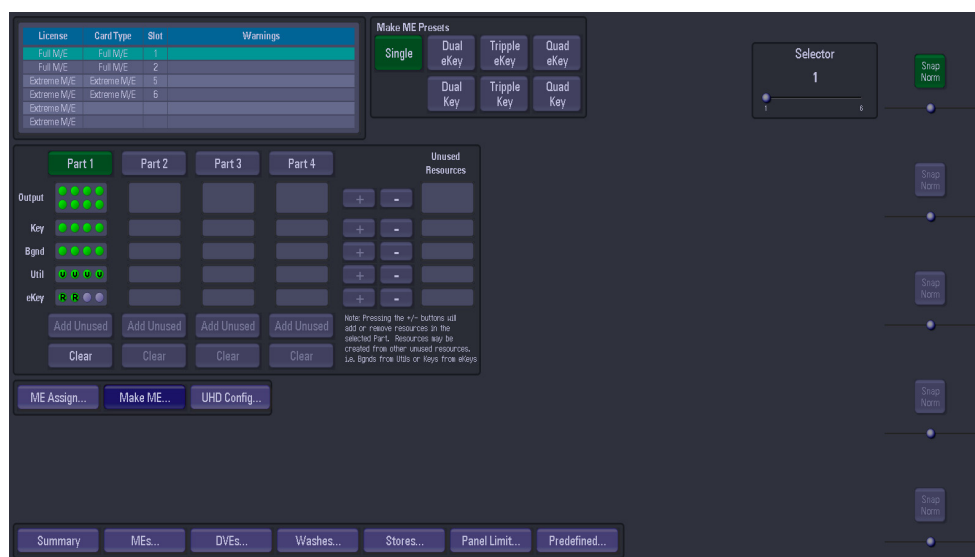
At the top of the menu is a table showing the information related to each of the cards fitted in the mainframe. The table displays the type of license allocated to the card, the type of card fitted and which slot in the mainframe the card is placed. If there are no cards fitted a warning is displayed in the warnings column.

> Note: Each M/E will have 2 permanent **eKeys** that are marked with the letter "**R**", this means that they are "**Real**" and cannot be changed in the **User Config - eKey Config** menu

Select a card using the Selector parameter and now the user can start allocating resources to M/E's.
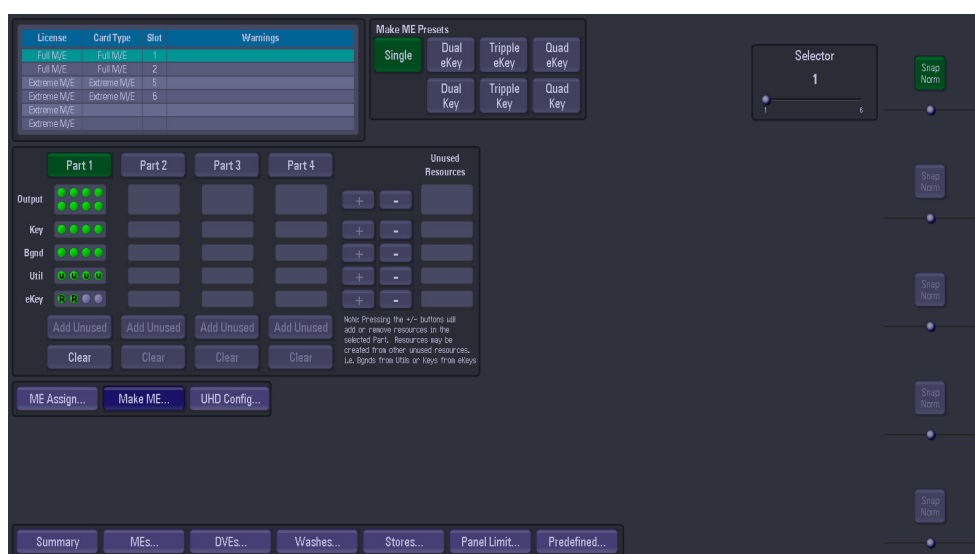
The flexibility of **Make ME technology** cannot be understated, it allows the user to create an M/E exactly the way they wish, the M/E can be as simple as; *1 M/E Output with 1 Key*, *2 M/E Outputs with 2 Backgrounds* or allocate all resources to 1 M/E, or any combination the user

wishes. When the resources are split across an M/E, M/Es can be shared across Logical Switchers allowing you to create up to 16 individual Logical Switchers which can be used as stand alone studio or OB production switchers with their own Maverik control surfaces attached.

In the default state, all resources are allocated to **Part 1** (shown on the previous page - which in effect is an M/E).

The easiest way to share the resources across a single M/E is by using the "**Make ME Presets**" **{Single}**, **{Dual eKey}** or **{Dual Key}, {Tripple eKey} or {Tripple Key} and {Quad eKey} or {Quad Key}** buttons. The buttons share resources evenly between the "**Part**" 1 to 4 resource columns, which will eventually become an M/E.

When selecting between "eKey" and "Key", some resources will be created from other unused resources.
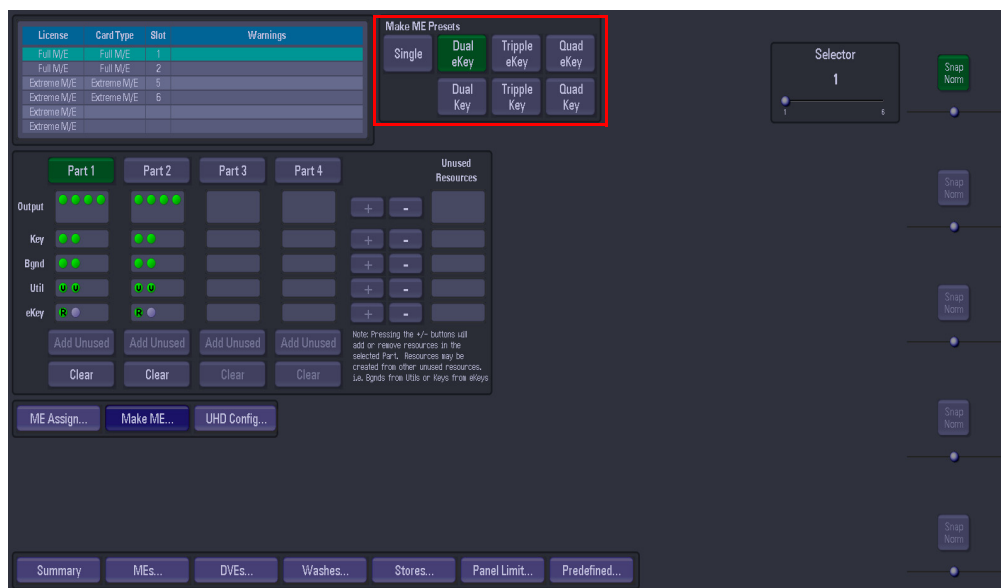
The user can also manually move resources around using the **{+/-}** buttons. Pressing the **{Clear}** button will move all resources from the selected "Part" into the "Unused Resources" column.

Selecting **Part 2** the user can now use the **{+}** button to move resources form the Unused Resources column into the **Part 2** column one by one or by pressing the **{Add Unused}** button, the unused resources will be moved into **Part 2**.
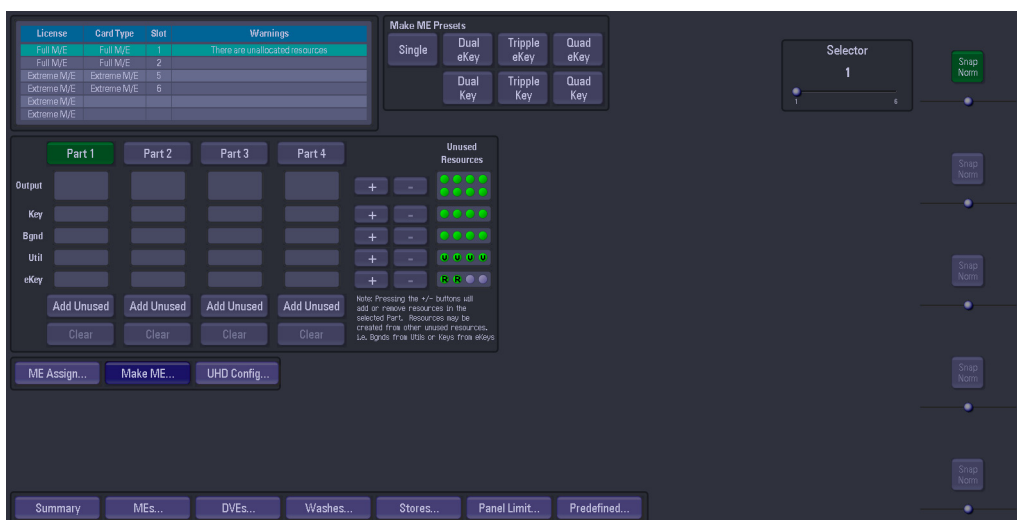
> Note: The Allocation of eKeys to an M/E and how they affect the switcher resources will be discussed in detail in the **User Config - eKey Config** menu.

The maximum number of M/E's that can be created for a logical switcher is 6, this does not mean that all the resources on the cards in the mainframe would be used, they can be shared between other logical switchers.

Once back in the MEs menu if the user has split the resources between Part 1 and Part 2 in the Make ME menu, the selected card will show 2 Grayed out buttons, by touching the buttons the user will create M/E's in the logical switcher.
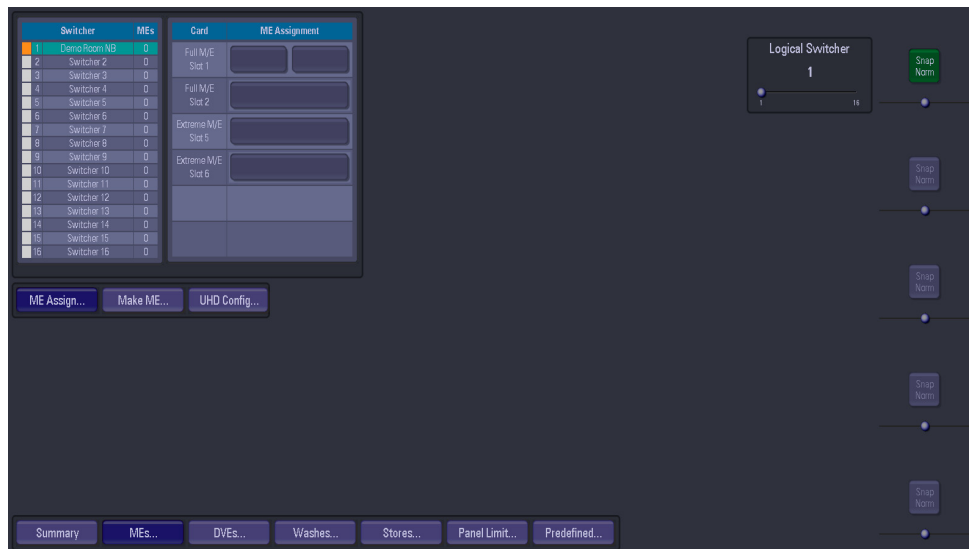
Turning Off all the M/E's in the **M/E Assignment** column double pressing (making the M/E buttons go Gray), the user can allocate the M/E number (i.e M/E1, M/E2 etc.) in any order, on any card they wish.

Using the diagram below as a reference, the user has selected a **Full M/E Slot 1,** first Gray button as M/E1, if the user now touches the third button down; "Extreme M/E slot 5", that M/E will now become M/E2 (shown below), allowing the M/E's to be moved around in any order the user wishes.

This would be very useful if the system is required to have an output M/E with full resources and M/E's 4 and 5 with only limited resources needed.
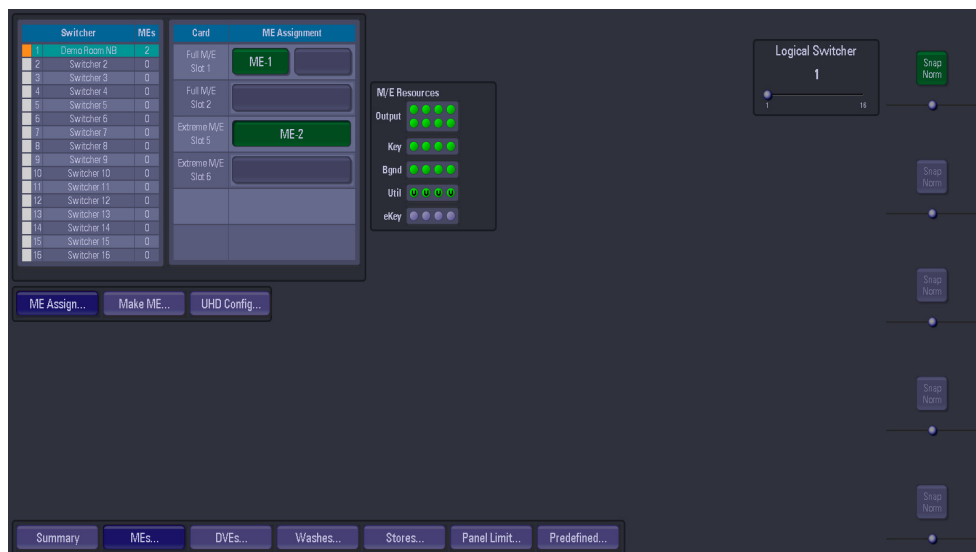
If a logical switcher is selected and there are no resources left to allocate then the M/E Assignment buttons will be grayed or and an "X" will be in the center, if the user tries to switch on an M/E than the button will turn Red (as shown below).
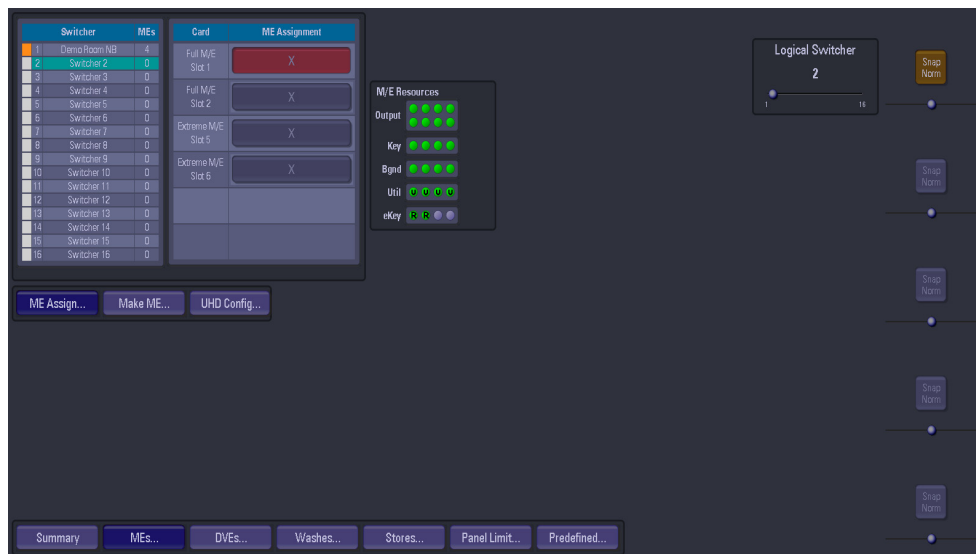
MakeME^{TM} and UHD

The unrivaled flexibility of Kahuna's Make ME software allows the user to allocate resources to a UHD and non UHD logical switcher setup which as before, can either be a single broadcast studio setup or split across a number of studios, allowing one studio to broadcast in HD and another in UHD or a mixture of both.

In the "**Connect**" menu, press the **{Mainframe Config}** button to enter the **Mainframe Configuration** menu, then press the **{Switcher Config...}** button.
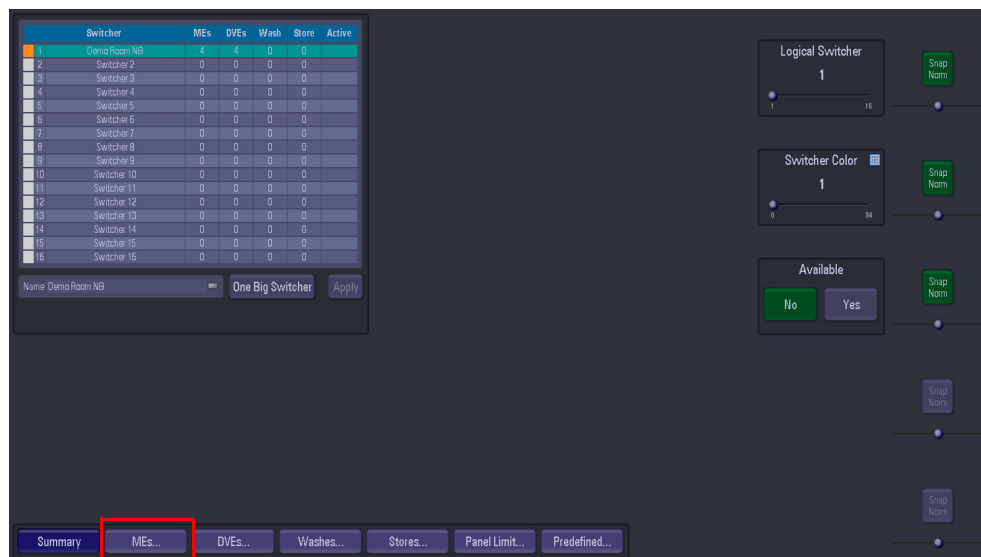
In the **Switcher Config** menu, press the **{MEs...}** menu link button to enter the "**MEs**" menu. As with a non UHD setup, this is where the resources are allocated to each M/E, so in this menu the user will allocate resources to a UHD setup and allocate the UHD quadrants within the M/Es.

Press the **{Make ME...}** menu link button, then in the "**MakeME**" menu use the "**Selector**" parameter to select the M/E/M/Es that will be use for UHD, then use the MakeME **Dual** or **Quad** buttons to quickly split the resources over the selected M/E (this can also be done by touching the "**Part2**"or "**Part4**" buttons and then use the **+/-** buttons to allocate resources individually).

It is important to decide how you split down the resources for a UHD configuration, as this will decide the type of UHD setup you will have available to you i.e. splitting the resources over 2 M/Es rather than 1 M/E will give you more resources such as the number of Keys, etc.

When using the "**Dual**" resource split, this would have to be done for the second M/E card in the mainframe as this would eventually make up the resources for the 4 quadrants over the 2 M/E cards.

Selecting the "**Quad**" resource split would eventually divide the resources for the 4 quadrants split over 1 M/E card.

Press the "**Back**" or "**Up**" button to come out of the menu and a dialog box will give a prompt to save the setup that has just been created, once saved, the **MEs** menu will now be displayed.

Note: When setting up M/Es for a UHD production, it is recommended that two M/Es are used and split into two to allow more resources to the UHD setup (as shown on the next page).

In the "**MEs**" menu, press the **{UHD Config...}** menu link button to open the "**UHD Quadrant Linking**" menu.
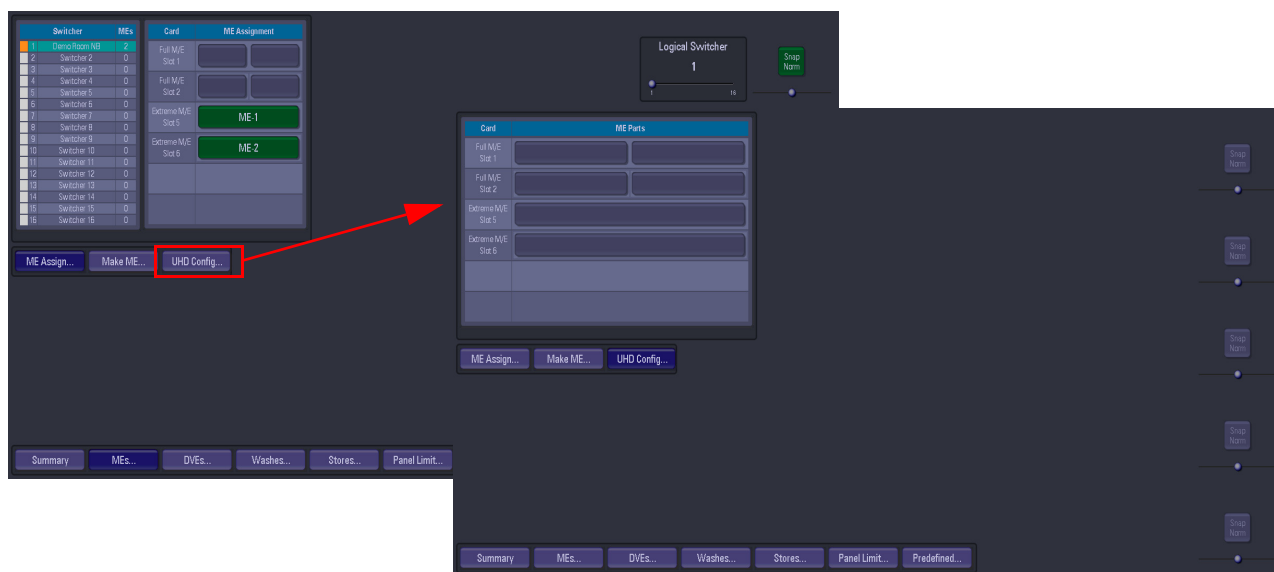
Touch the **top left quadrant** blank button and all four UHD quadrants are assigned (as shown below). Notice that the quadrants a labeled UHD(T/L), UHD(T/R), UHD(B/L) and UHD(B/R).

Press the **{MakeME...}** menu link button to go back to the "**MEs**" menu to assign the M/Es to the cards.

This is done in the normal way by touching each of the blank buttons in turn, notice that each button now has "UHD" displayed on the button, the buttons have to be pressed once again to assign the M/Es.

Notice that the buttons have now turned green and each one says "**ME-3**" in the diagram below. Obviously this will be different depending on the user defined setup.

> Note: If the M/E Assignment buttons are not **pressed twice** so that they turn green and display the allocated M/E, the **UHD setup will not work!**

Press the "**Back**" or "**Up**" button to come out of the menu and a dialog box will give a prompt to save the setup that has just been created, once saved, the **Mainframe Configuration** menu will now be displayed, then press the "**Up**" button once again to display the "Connect" menu. From here press the "**Logical Switcher**" button for the required logical switcher, to login.

DVEs

This menu displays all the resources allocated to logical switchers, at a glance, the user can see the DVE tiles allocated. There are four DVE Tiles per DVE card fitted in the mainframe.
Press the **{DVEs...}** button to enter the Configuration DVEs menu.

The menu displays the number of DVE cards fitted to the mainframe and how the DVE Tiles are allocated across logical switchers.

Notice that there are 4 DVE Tiles in each DVE card slot in the DVE Tile Assignment column, any of these DVE Tiles can be assigned to other switchers, by simply touching the Green DVE tile buttons to turn them gray, then use the Logical Switcher parameter to select one of the other 15 switchers in the table and touch the DVE tile button once again it will turn green indicating that the DVE tile has been selected and assigned to the selected switcher.

If the DVE tile button is Gray and has a cross on it, this means that the DVE tile is assigned to another logical switcher.

> Note: When any changes are made to the **Configuration DVEs** menu, a warning dialog box will be displayed asking the user if the changes are to be **Saved** or **Discarded**.

Washes

There are 2 Washes available if 2 Router cards are fitted to a Kahuna mainframe (1 per Router card). Washes can be allocated to logical switchers in the same way as M/Es. Select a logical switcher using the parameter and then press the **{Wash}** button (buttons are Green but go Gray when selected) and the wash is allocated to the logical switcher. If there is only 1 router card; and the user tries to select the second wash the button will turn Red; signaling that the wash is not available to use.
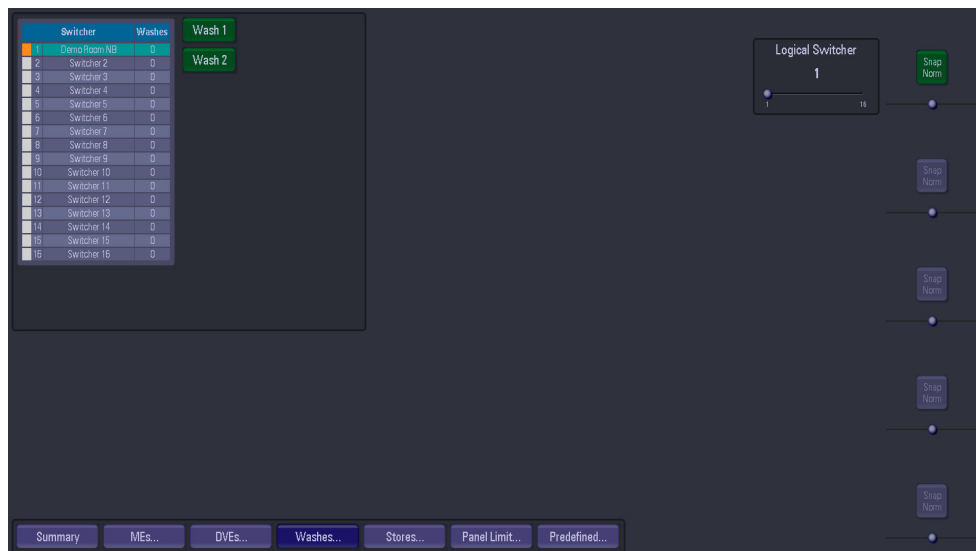
Stores

There are 20 Stores available if 2 Router cards are fitted to a Kahuna mainframe (10 per Router card). Stores can be freely allocated to logical switchers in the same way a s M/Es. and Washes. Select a logical switcher using the parameter and then touch the store buttons **{1} - {20}** selecting the number of stores for each logical switcher (buttons are Green but go Gray when selected) and the Stores are allocated to the logical switcher. If there is only 1 router card; and the user tries to select Stores 11 - 16 the buttons will not select; signaling that the stores are not available to use
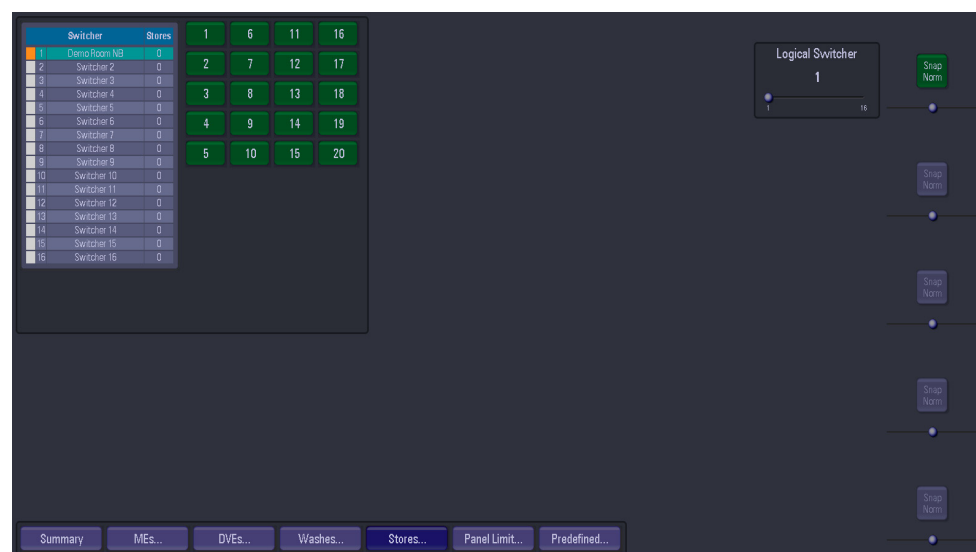
Panel Limit

Panel limit, as the name suggests, limits the number of panels that can be logged into an individual logical switcher.
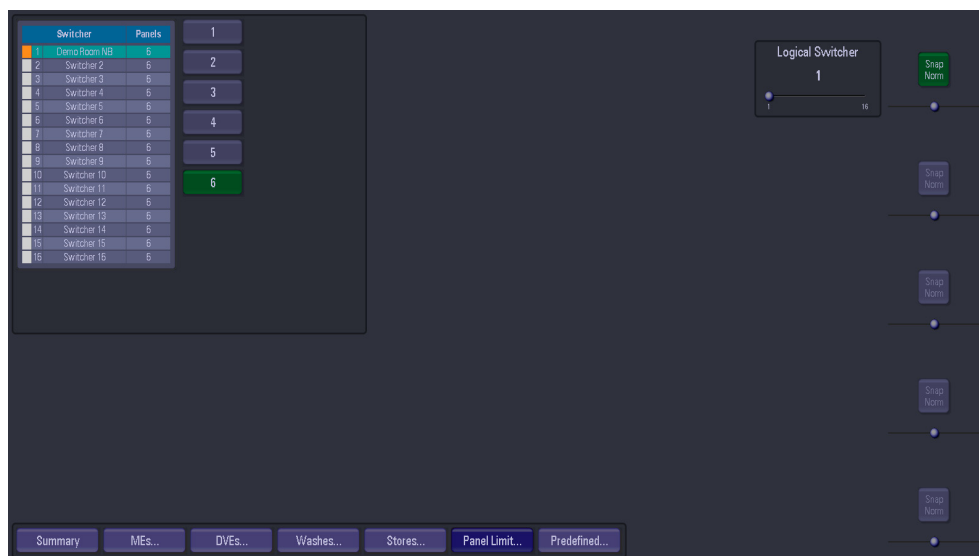
To user Panel Login Limit, select a logical switcher in the table, then touch a number button from 1 to 6 to select the number of panels that can log into the logical switcher.

Predefined Config

Predefined Config menu allows the user to create up to 32 predefined switcher configurations, the logical switcher configurations will have been setup and resources allocated in the previous menu's. In this menu the user has the ability to save a configuration and then access that configuration to add or take away resources with out having to build a new logical switcher.

Once a predefined config has been created and saved, the user is able to add to each of the resource menu's in the future, a prompt menu to save any updates will appear, this will then be saved to the predefined switcher configuration.
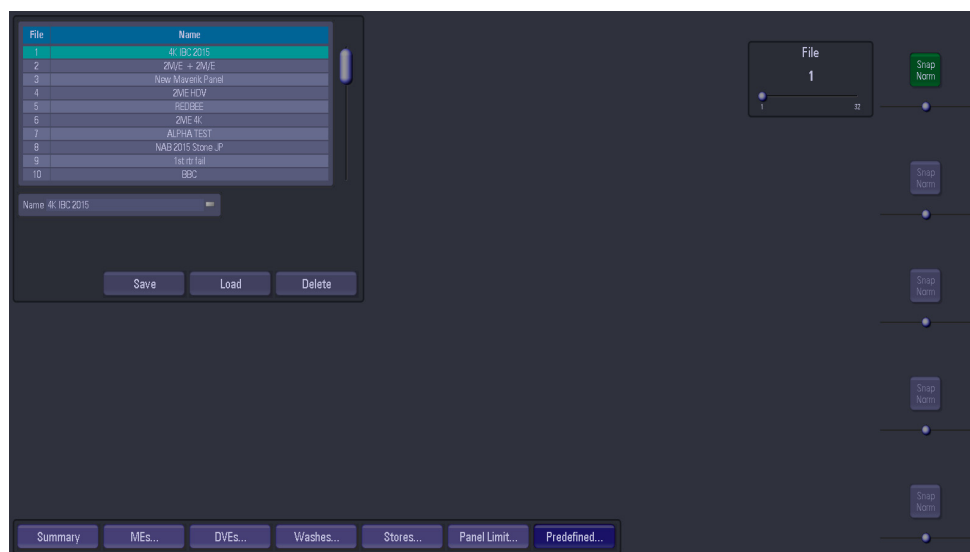
Upgrade

This menu allows the user to upgrade the Mainframe and the Panel at the same time.
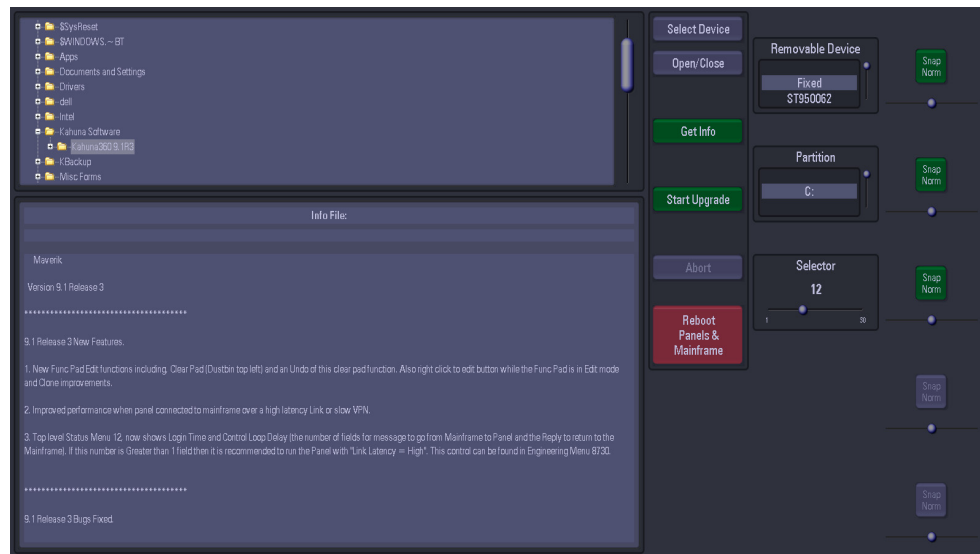
To upgrade the software, insert a USB memory device into one of the USB ports, use the "**Removable Device**" parameter to select the USB device and then touch the **{Select Device}** button. All the information on the memory device will be displayed as a filing system top left of the screen, multiple versions of software can be stored on the memory device, so the user needs to select the required version using the *Selector* parameter control. Touching the "+" next to the software folder will expand out the folder and display the contents.
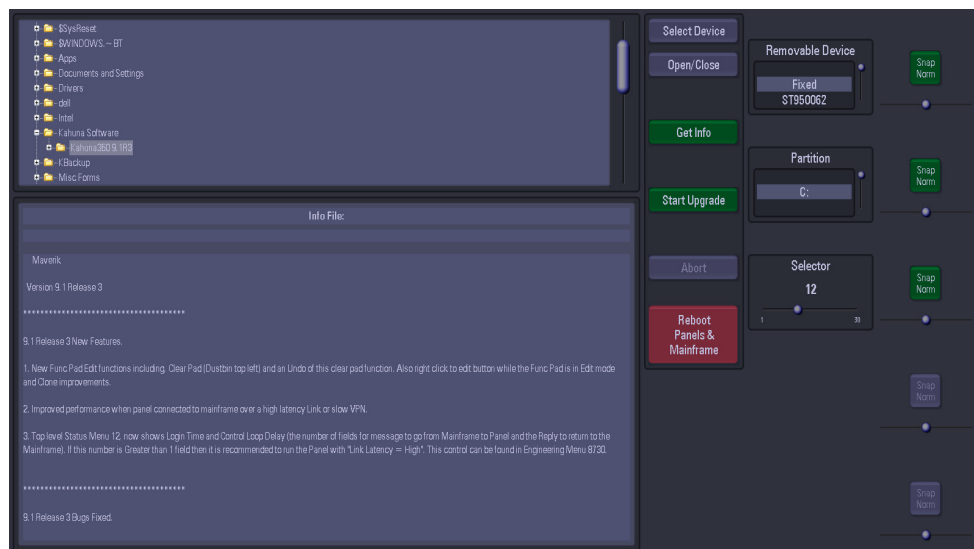
Next touch the **{Get Info}** button and information related to the selected software from the software.txt file will be displayed in the information area. When satisfied that the correct software has been selected, touch the **{Start Upgrade}** button.
The software will take a few minutes to upgrade the system, when finished the user is prompted to **Reboot Panel & Mainframe** (the red button in the diagram above).
The system software upgrade is now complete.

Log into the System and Set Up a User Account

This section of the manual will deal with the setup of a "Show". Shows allow the user to quickly change use defined switcher setup's or maybe a better explanation is that this function allows operators in a studio or OB truck to create shows and then switch between show configurations such as a News program to a Sport program etc.

Once back in the Connect menu (at this point the mainframe configuration should have been setup) select a Switcher from the **Switcher Login** column and press the selected switcher button.
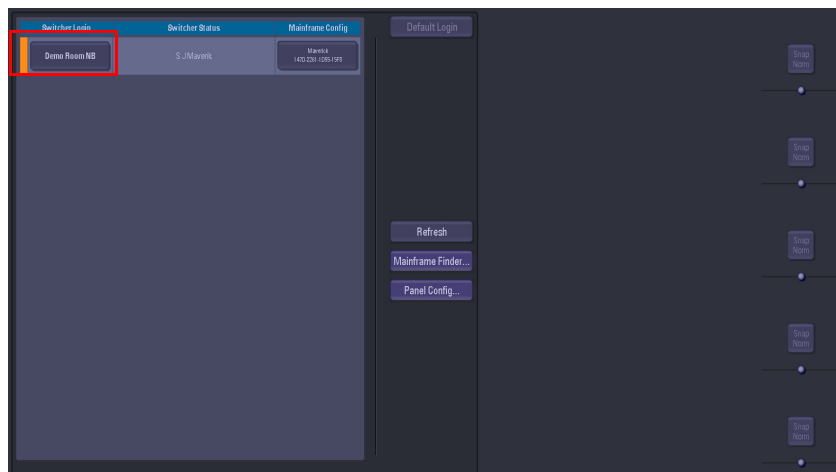
After selecting a switcher, the **Login as Operator** menu should appear. This menu contains User Accounts that will have been setup in the **Engineering Config - Access Control** menu.

Note: Only users with engineering rights are able to setup a user account. Setting up a user account will be explained in detail in the Engineering Config section of this manual.

Mainframe currently connected to

Goes back to Connect Menu
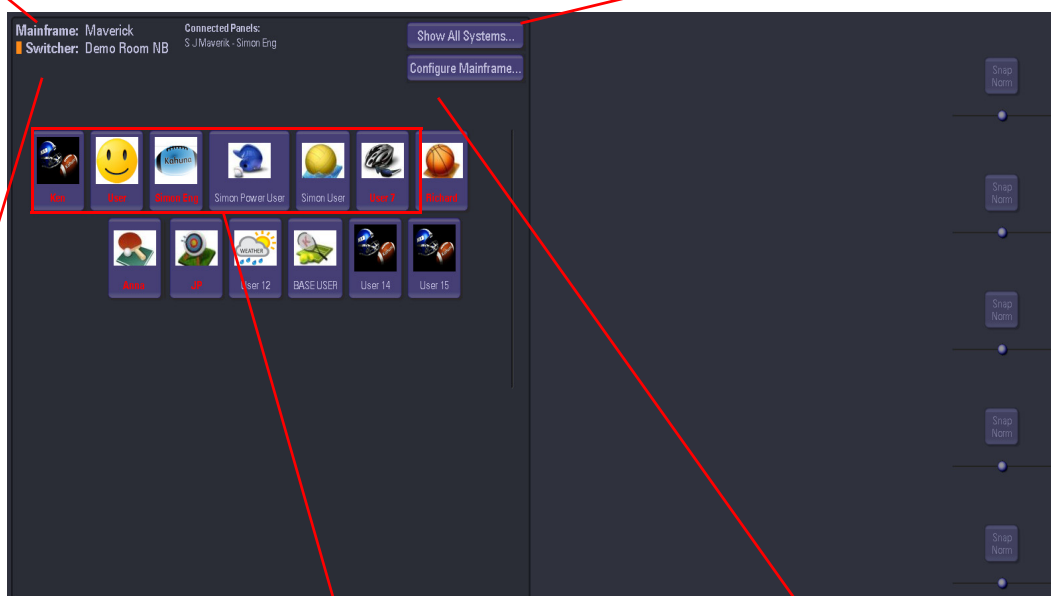
Switcher currently connected to

User Accounts

Goes back to Mainframe Configuration menu

If the first menu that appears is the "**Connected to.....**" menu, then either no user accounts have been setup or the system has been set to bypass the Login as Operator menu. This will be explained later in the section in the "**Defaults**" menu description.

The "**Connected to**" menu has a number of options for you to save the current state of the system quickly as will be described below:
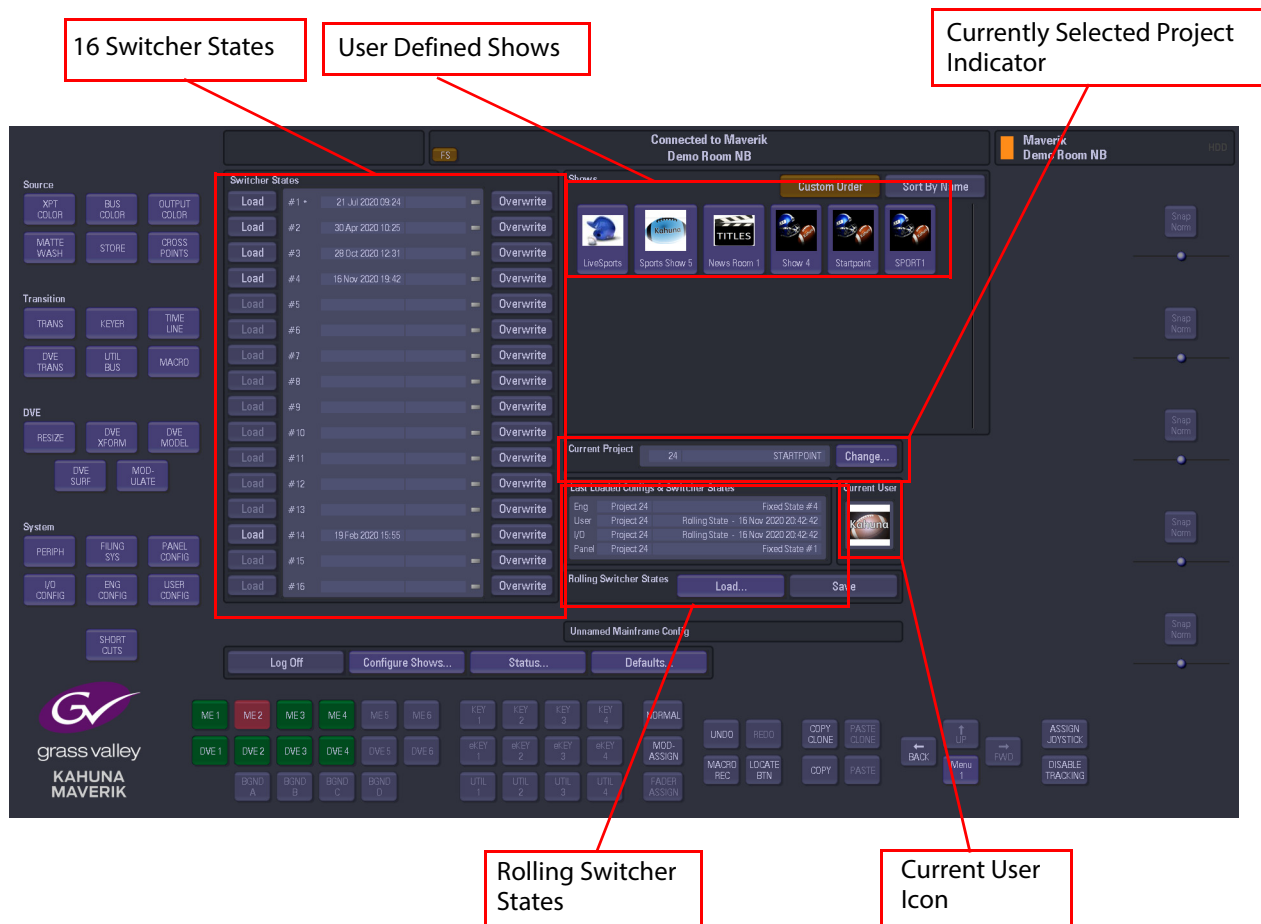
Options when Saving Files

Kahuna is a very flexible system and gives you a number of options to Save. There are Switcher States, Rolling Switcher States, Effects Memory Recalls, individual Configuration Files and Snapshots. This sounds like a lot of options, but how they are applied will depend on what you want to do with the system.

Switcher States

The fastest way to save the current system setup state is done by using the "**Switcher States**" Overwrite option.
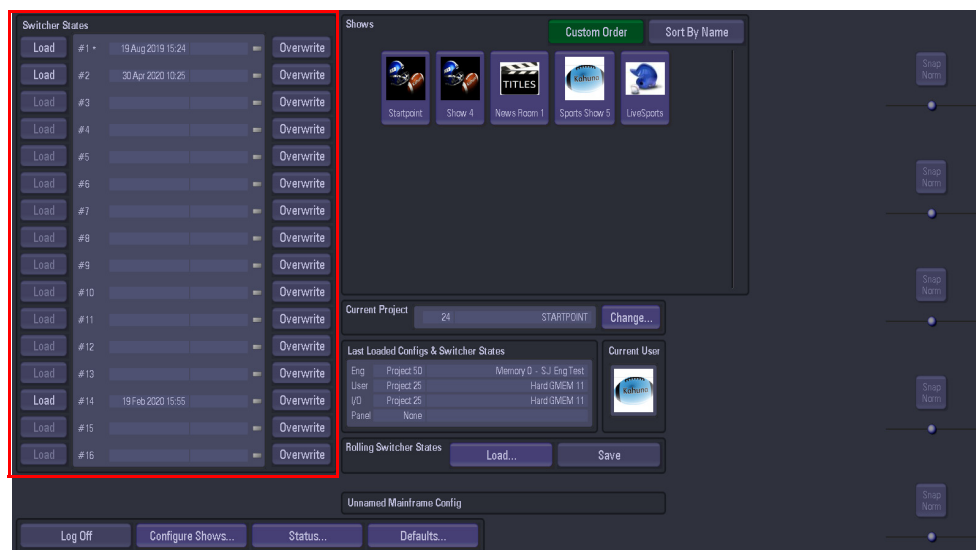
There are 16 Switcher States available to use per "Project". The table of 16 fixed Switcher States are used as a one button press **"Save and Load Everything"** function that can be written to an unlimited number of times. **Switcher State - Overwrite** allows the user to save the current **"Switcher State"** at different points in time.

This is very useful as you may want to keep the current original saved state, but may also want to add a newly created DMEMs or add Stores etc, which can be saved in one of the Switcher State slots.
This is done by pressing the **{Overwrite}** button. The date and time that the Switcher State was saved (overwritten) is displayed in the list. By touching the boxed area next to the time and date, a name can be given to the Switcher State using an on-screen keyboard. Touch **{Load}** button to load the saved Switcher State.

When overwriting an already saved switcher state, a dialog box will be displayed, touch "OK" to proceed. **Caution!** - If you press the **{Clear File}** button, the switcher state will be erased.

When "**Loading**" a switcher state, you can set the currently selected switcher state as the "Default **State"** that loads at start up or reboot.

This can be set in 2 places; in the "Connected **to…"** menu. Touch the **{Load}** button on one of the switcher states in the table and a dialog box will appear. Here you have the option to set the currently selected Switcher State as the default (as shown below).
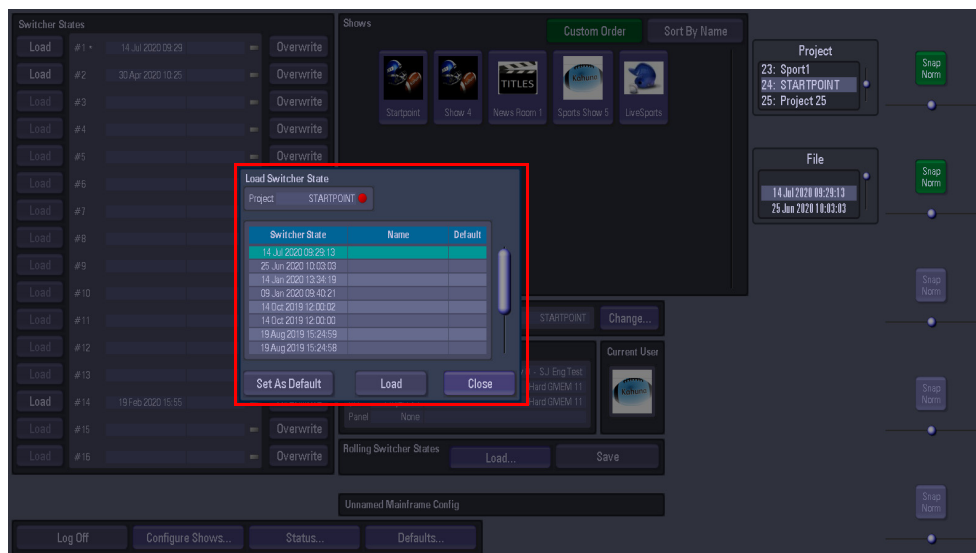
Switcher State Warning Message

If a switcher state is saved before logging out of the switcher and then the resource setup of the switcher is changed in the "**Mainframe Config**" menu, for example; M/E configuration is changed in the "**Make ME**" menu, after making the change you save the new setup as the current "Predefined **Switcher Resource Configuration"**.

When you log back into the logical switcher and try to load the original saved Switcher State a warning message will be displayed.
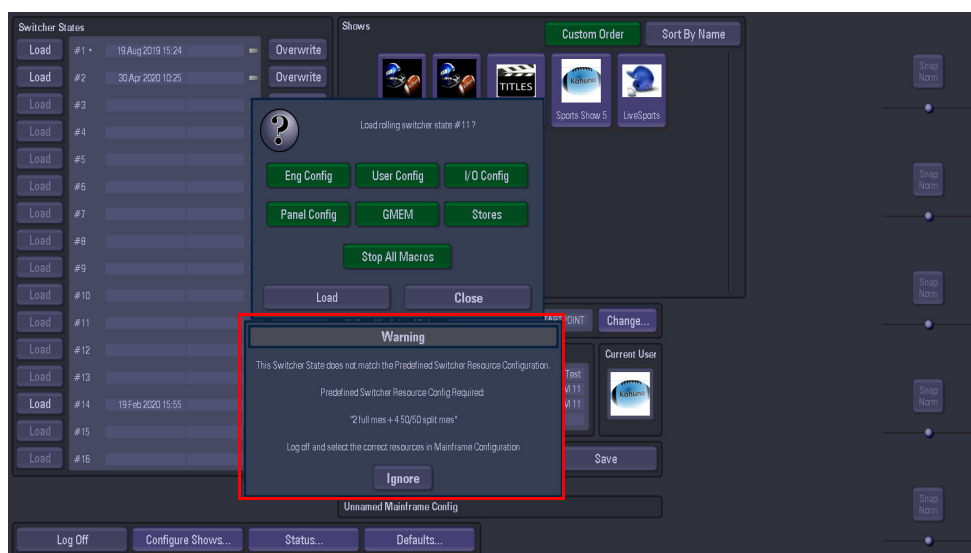
The warning message will inform you that the switcher state does not match the "Predefined **Switcher Resource Configuration"** and will inform you what the predefined switcher resource config requires.

If you touch the **{Ignore}** button the saved switcher state will not load properly.

Rolling Switcher States

Rolling Switcher States is the method of quickly saving the overall state of the system. This allows the user to save up to 100 Switcher States in to a **"Rolling List"** of saved states, which will keep rolling over after 100 states has been reached. The **"Rolling Switcher State"** function is different to the Switcher State Overwrite mentioned above, because when the user touches the **"Load"** button, the menu will change to display a list of saved states and the option to enable/disable Stores, Panel, User and Eng Configs and DMEM functions when loading a saved state. You can also set any one of the switcher states as the default startup state.
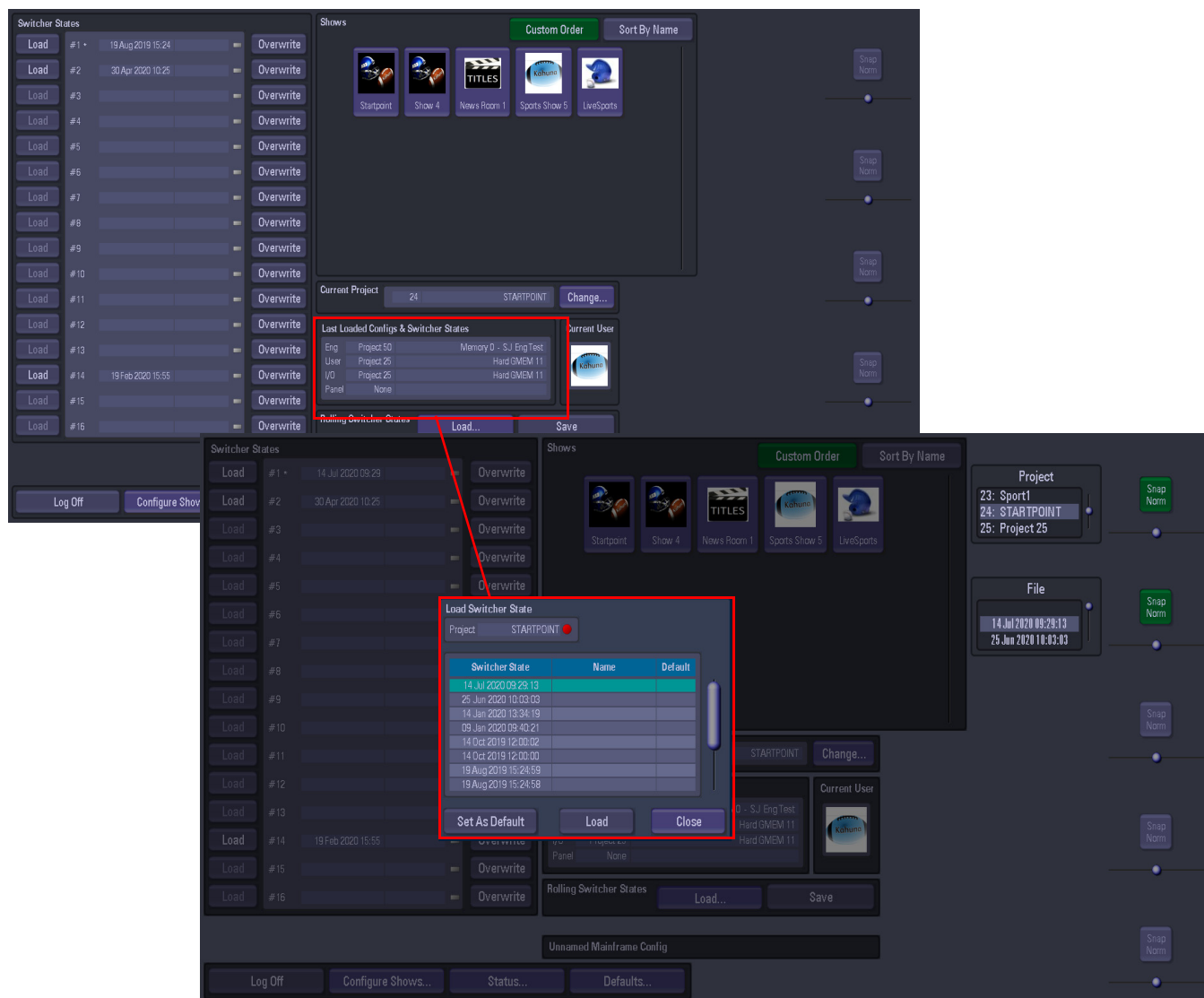
Each time the **{Save}** button is pressed a switcher state is saved into the rolling list.

In the "**Rolling Switcher State"** Load menu, you can also set a saved switcher state file as the "**Default State"** that loads at start up or reboot. When you touch the **{Load}** button a **"Load Switcher State"** dialog box will open and display a list of switcher states. Select the required switcher state by touching the state in the table (the row will turn blue) and then touch the {**Set As Default}** button. The "**Set As Default**" button will turn green and "**Yes**" is displayed in the "**Default**" column.

Hard Disk Drive Activity Indicator

A new addition is a visual indicator for hard disk drive activity. The indicator (always displayed in the top right corner of the menu) will flash from time to time depending on the type of activity happening.
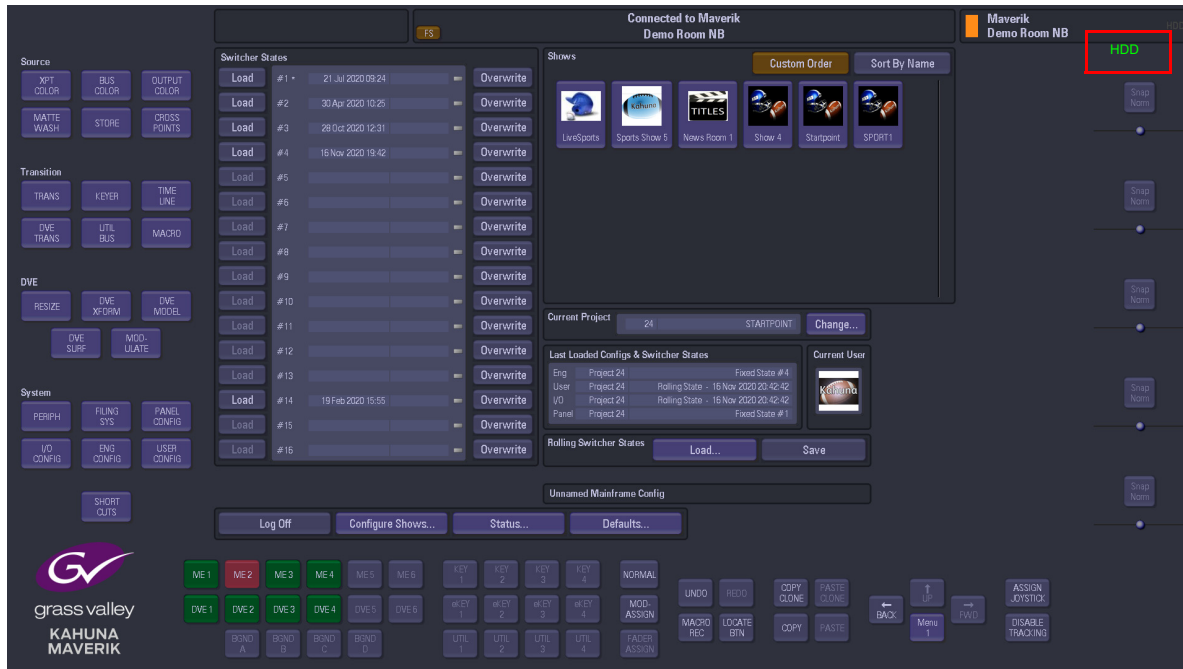
There are three different states indicated with the "HDD" symbol:

- Red HDD = the hard disk is being written to
- Green HDD = the hard disk is reading
- Orange HDD = the hard disk is mounting

Creating a Show

Shows are used as individual system and control surface setups that can be easily be identified and quickly loaded when required. Shows are useful for example when a studio or OB setup has a single Kahuna mainframe with more than one control surface which are used for broadcasting a number of different sports events and news broadcasts.

Press the **{Configure Shows...}** button to enter the Configure shows menu.
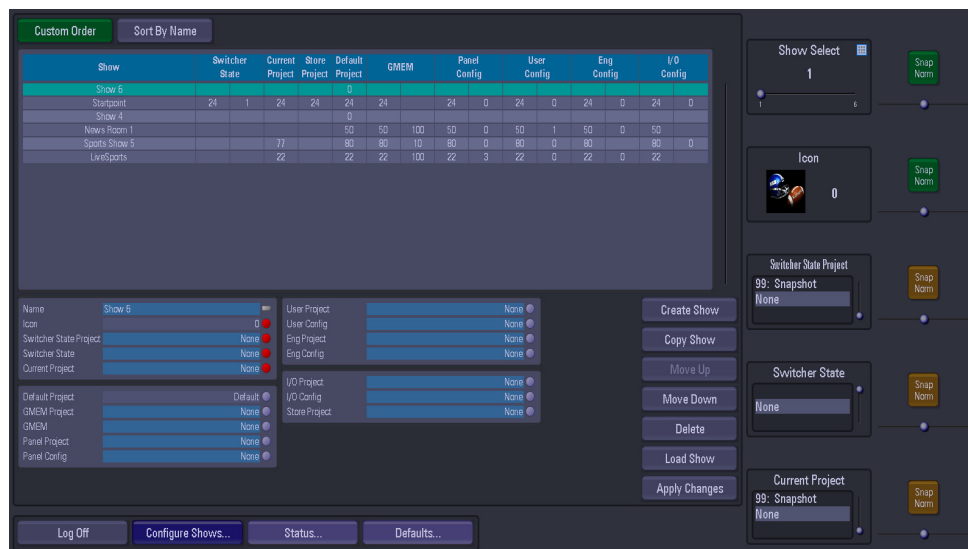
Touch the **{Create Show}** button and a new show will be added to the top of the table. Touch the "Name" red oblong button twice to display the on-screen keyboard to give the show a name. The show can be moved down the show order by pressing the **{Move Down}** button and vice versa using the **{Move Up}** button.
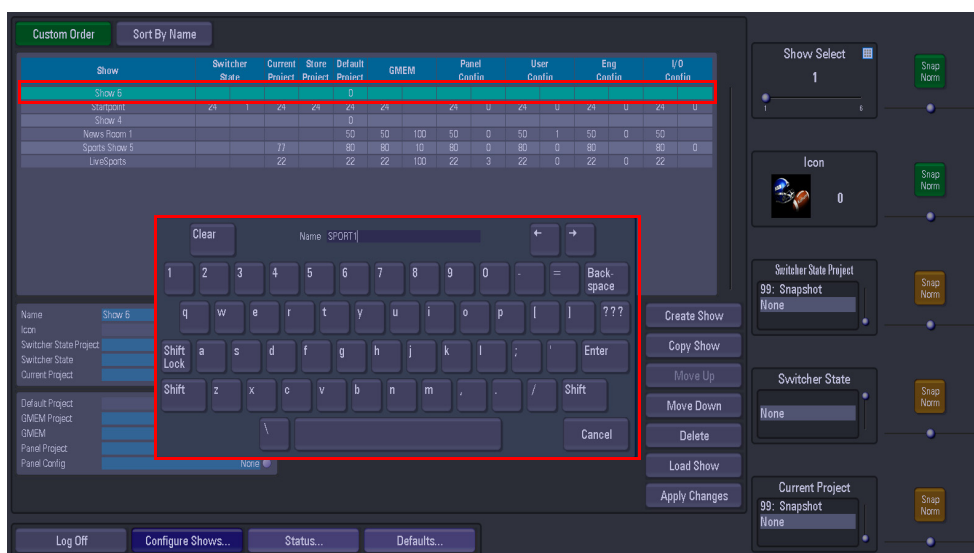
Use the parameter controls to select the required Projects, Configs and GMEM's as required from the attachers in the menu.

Note: If there are no Projects, Configs or GMEM's already setup, they can be added to a show at any point later when created. See the section "Important Things to you need to Know" for more information about creating projects.

If an icon is required for easy recognition of the show, use the parameter controls to scroll through the icons and finally when happy with the show setup press the **{Apply Changes}** button.
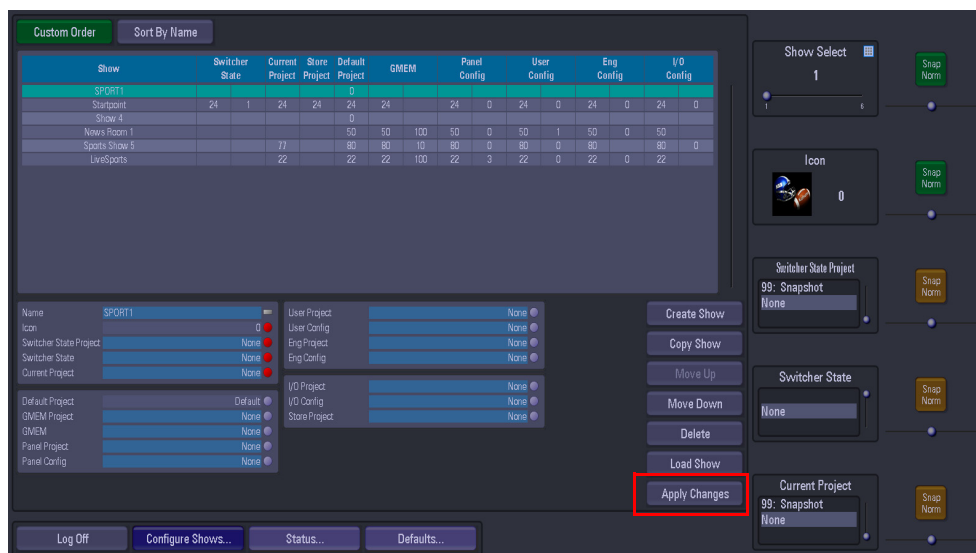
To Delete a show, use the **Show Select** parameter to select the show and then press the **{Delete}** button.
To Load a show, again use the Show Select parameter to select the show and then press the **{Load Show}** button.
A show has now been created and will be displayed along with other shows at the top of the **Connected to** menu. To load a show in this menu, touch the show icon and a dialog box will appear asking the user if they want to load the show.

Status

In the **Connected** menu, press the **{Status…}** button to get to the **Status** menu.
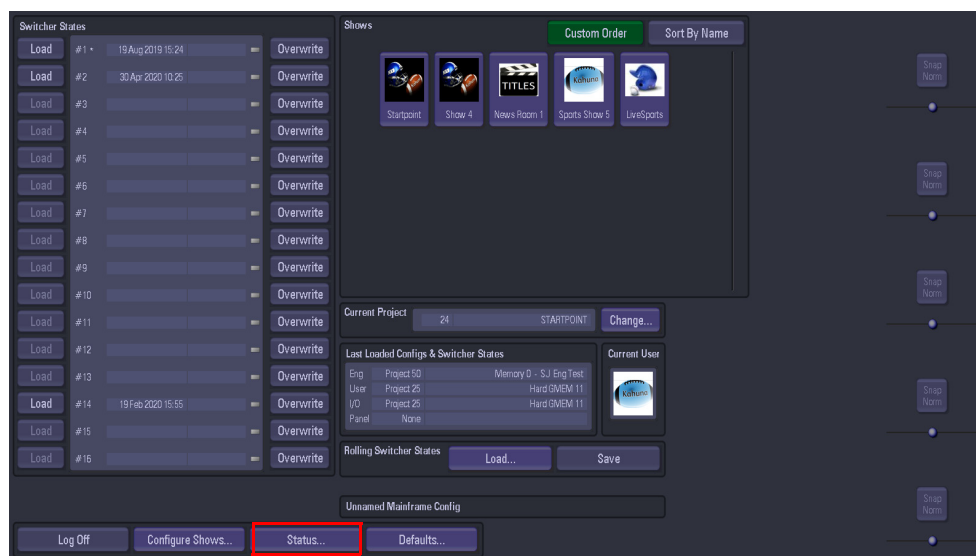
This menu displays the current status of a Kahuna system, the information includes, the GUI Panel and Mainframe software versions and IP address of the Panel and the Mainframe, the mainframe and panel names, the panels connected to the system and the time/day/date and also the mainframe serial number. It also displays information related to the software version.
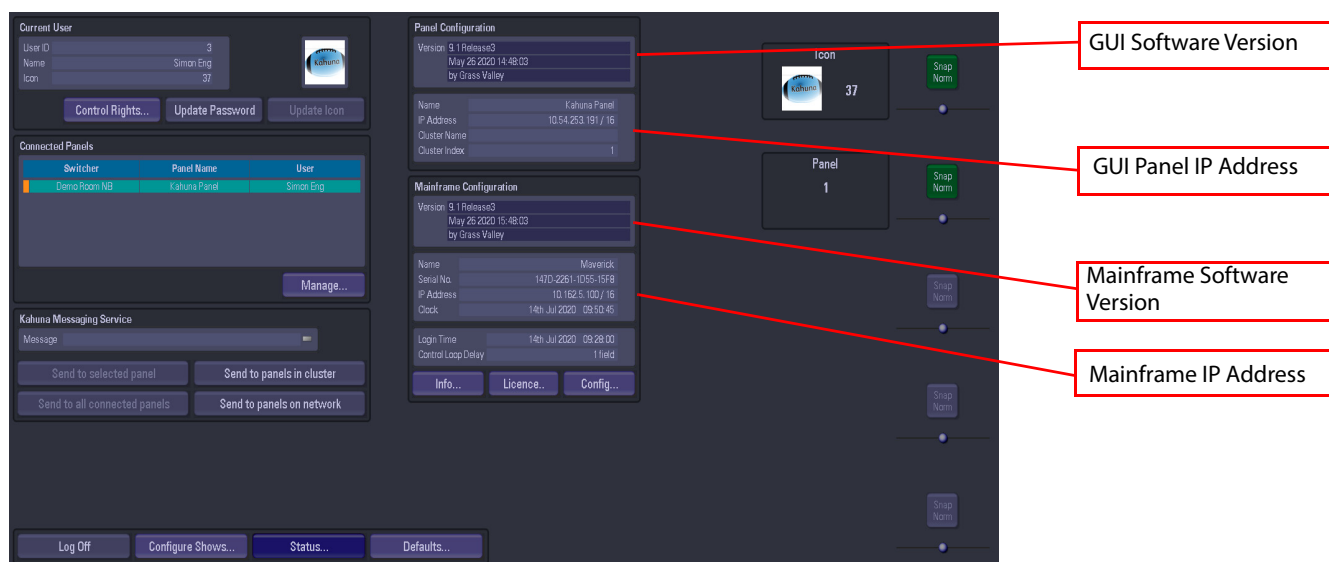
The menu also allows access to sub menus that contain information about the number of control surfaces connected to the mainframe, Control Rights, Updating the Password, Configuration Summary about how the mainframe is configured, mainframe License information and information about the current software.

Details

This menu allows the user to see all GUI panels or GUI Processors connected to the mainframe. The menu has 2 main functions:

- To ask the other panels to log out of the system.
- To send messages to other users.

If the Kahuna Mainframe is going to be up-graded with new software, and there are multiple GUI panels logged in, before the upgrade can take place the other users have to be logged out.

Pressing the **{Ask selected panels to log off}** will send an automated message asking other users to log off, or press **{Ask Other panels to log off}**.
Using the Kahuna Messaging Service, a message can be sent out a message asking users to logout.

> Note: If no answer is sent back, the user can press "Ask selected panels to log off" a second time and a dialog box will appear suggesting that the other users will be logged out automatically.

Connected Panels
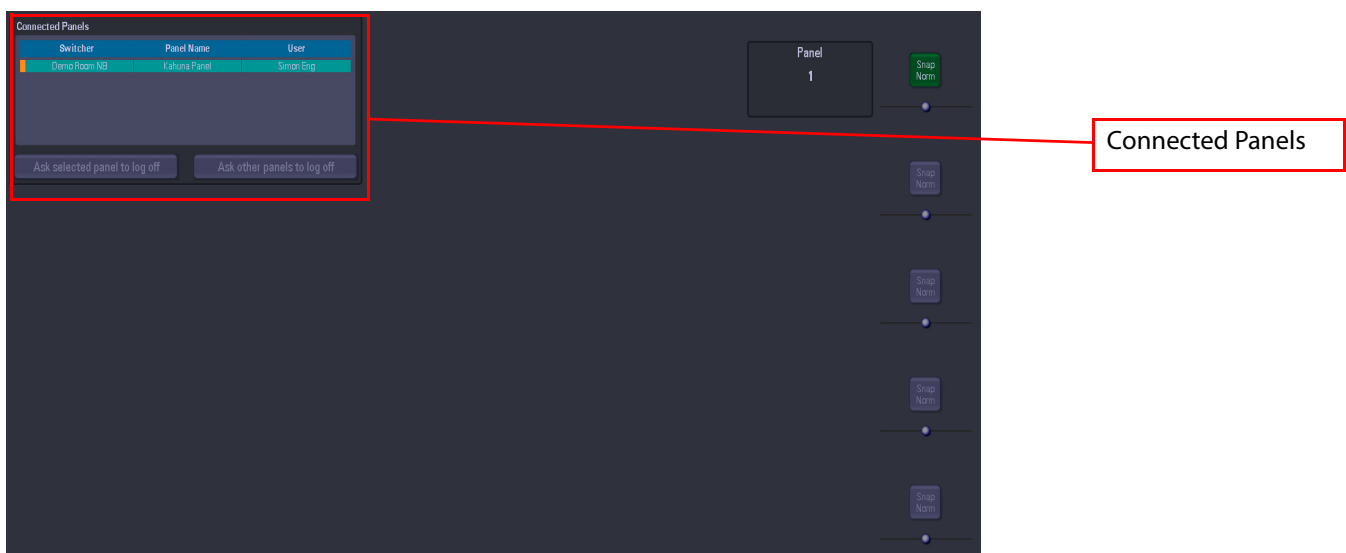
Control Rights

This menu displays the type of control rights of the current user.
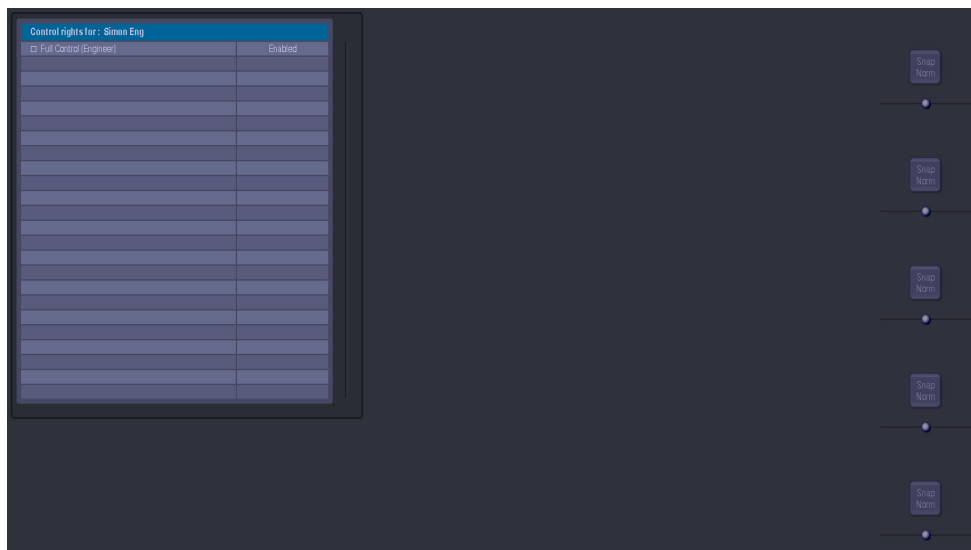
Info

Touch the **{Info...}** button and information relating to the specific software release is shown in the **Status - Upgrade Information** menu.

> Note: Press the **[UP]** button on the GUI to get back to the Connect menu.
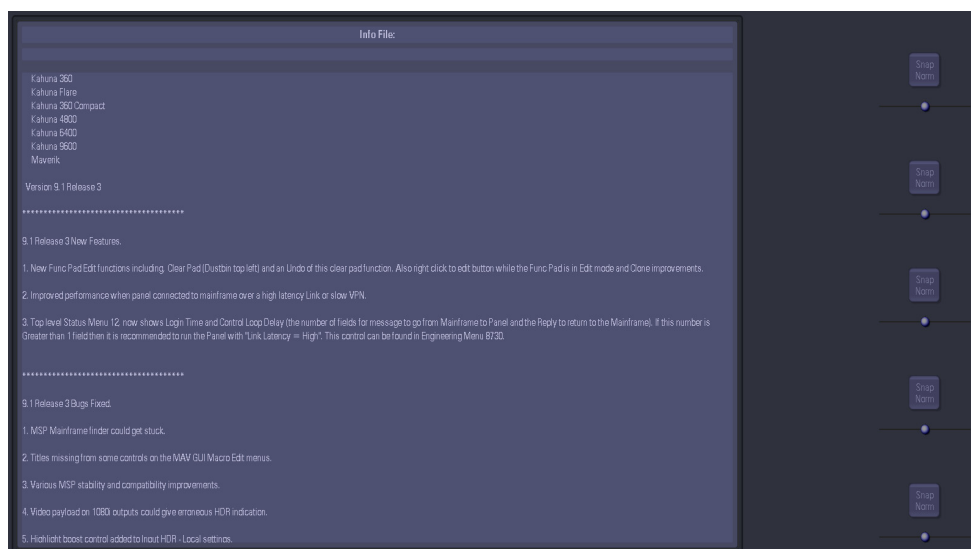
Config

Touch the **{Config...}** button, this will display the **Status - Configuration - Summary** menu.

> Note: The menu displays the current setup of the mainframe. it displays of the mainframe is configured as one mainframe or has been split down into several mainframes.

> Note: Press the **[UP]** button on the GUI to get back to the Status menu.
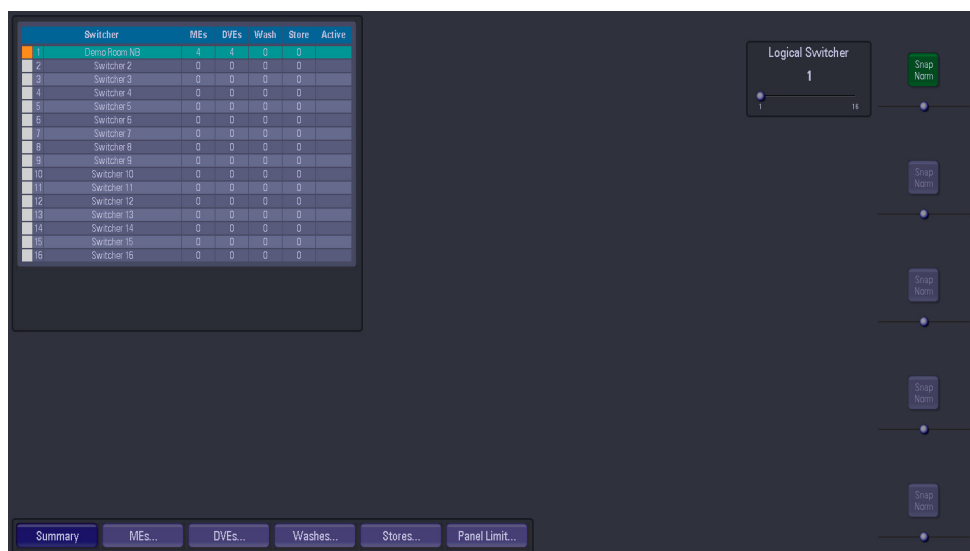
Once back in the Status menu, the **Current User** section at the bottom of the menu allows the user to update the password and icon of the user's account (originally created in the **Eng Config - Access Control** menu). To update the password; press the **{Update Password}** button and a dialog box will appear with a number pad. Follow the on-screen instructions to update the user password.
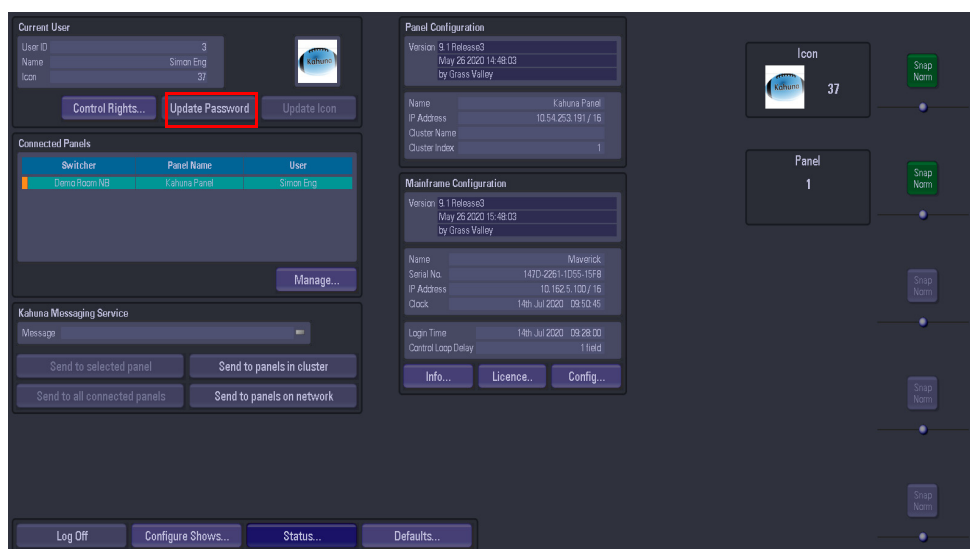
Defaults

The Defaults menu is used to setup the default start up configuration. The default start up will need to include pre-saved Projects, GMEM's and Configs etc. All this information will dictate the way the mainframe starts up after power-up and log-in. In this menu, the mainframe can also be reset to a default configuration state.
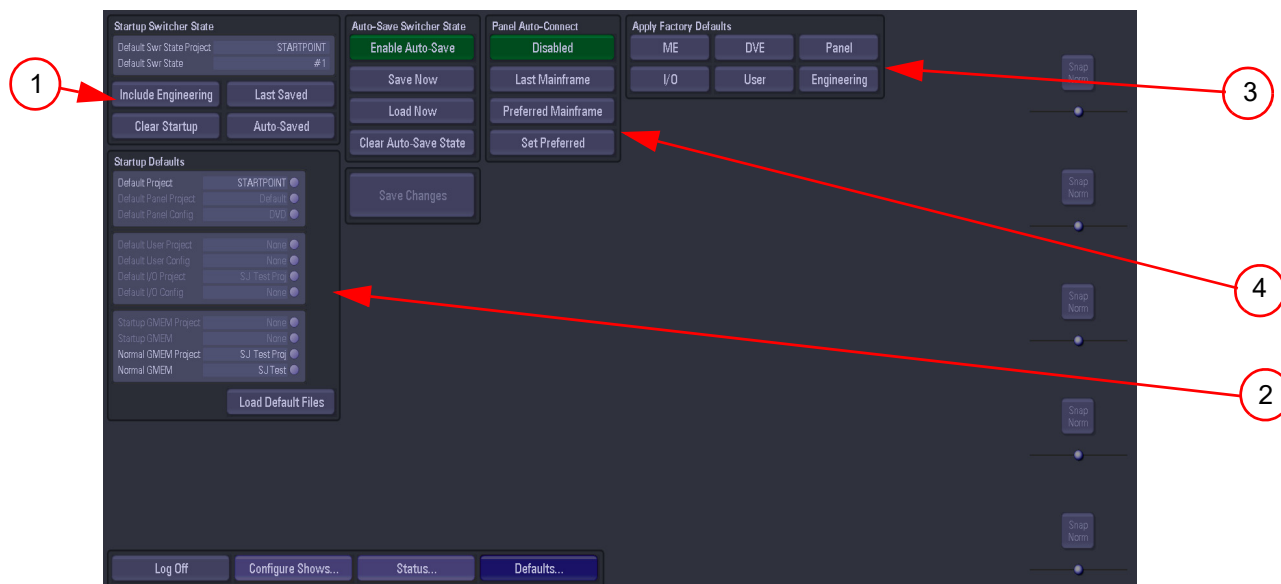
On the left hand side of the screen under the Startup Defaults heading (1) there are three attacher boxes, touch an attacher to reveal the parameter controls associated with the selected functions (2).

Touch the top attacher box to set the Default Project, Default Panel Project and Default Panel Config. The next attacher down is the Default User Project/Config and Default I/O Project and Config. Touch the bottom attacher to set the startup GMEM's.

After making changes to the startup default parameters, press the **{Load Defaults Files}** button to load the new startup settings, then press the **{Save Changes}** action button to save the new Startup Defaults.

> Note: The Startup GMEM loads when the mainframe is powered up
> Normal GMEM is used when any GMEM is set to use normal values when saved.
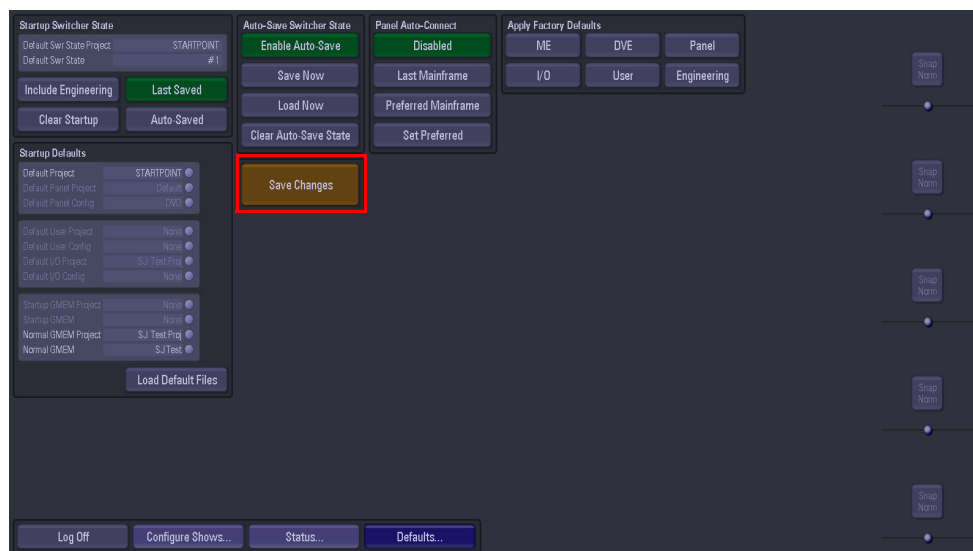
Pressing one of the menu buttons in the **Apply Factory Defaults** box (3), will cause the system to be reset to a factory reset configuration.

Pressing one of the Apply Factory Defaults buttons will not erase the startup files stored in mainframe hard drive, it will only step out of the default startup files that are currently loaded. The pre-saved startup GMEM/Config files may be accessed at any time.
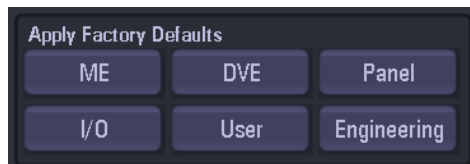
In the center of the screen is the **Panel Auto-Connect** box (4), from here the system can be set to automatically connect to a preferred mainframe each time the system is switched on and boots up. Press the **{Preferred Mainframe}** button, the next time the system is switched on, at boot up, the system will go straight to the **Connected to** menu. The **{Last Mainframe}** button sets the mainframe to start up as the last mainframe that the system was being used as. Press the **{Disabled}** button to disable these functions.
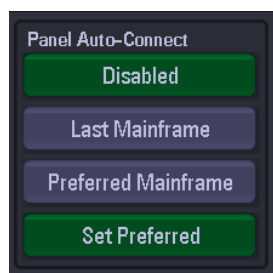
When the **Startup Switcher State - Auto Saved** is enabled, it periodically performs an auto-save of the systems state. Auto-save state is effectively like an extra switcher state which is saved outside the normal file system area.
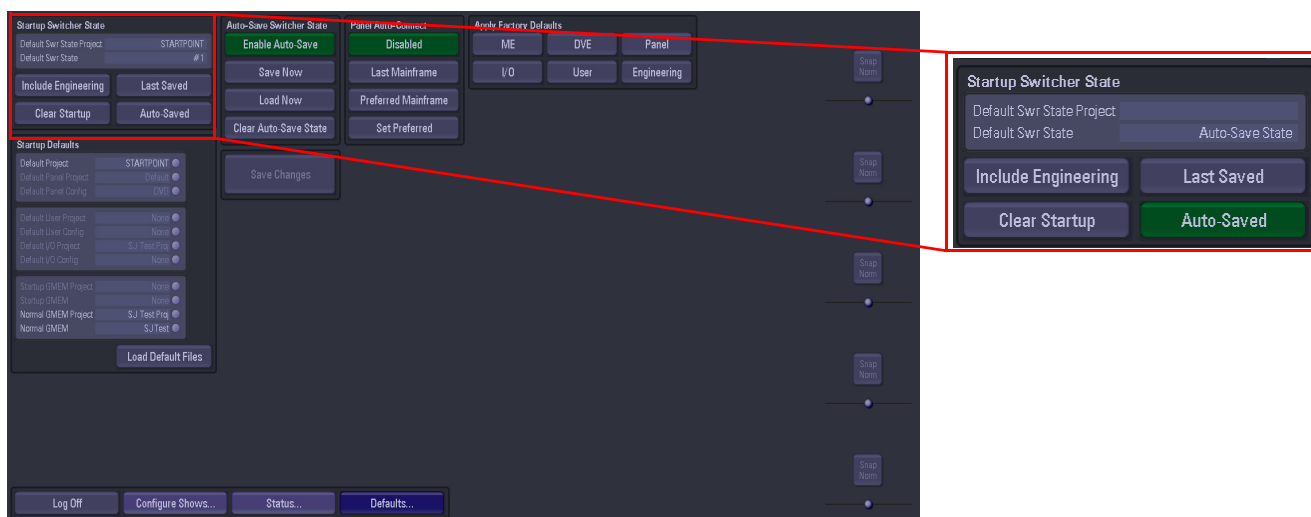
If the system is accidentally turned off part way through saving a new state, there are two copies of the switcher state data to avoid complete loss. The auto-save state is made up of the logical switcher state, plus another state for each control panel. When "**Auto Saved"** is enabled in the "**Defaults**" menu (as shown above), the mainframe will save a new copy of its state thirty seconds after a significant change occurs, for example; a parameter is modified, a file is loaded, a panel logs out etc. Similarly, a control panel will save a new copy of its state thirty seconds

after a significant panel change occurs, for example; a delegate is changed, a button map is loaded/unloaded, a panel config file is loaded etc. The control surface also saves its state before logging out.

Log Off

Pressing the **{Log Off}** button will to go back to the **Connect** menu, after pressing the button a dialog box with a prompt message will then appear asking the user if they actually do wish to Log Off.
This is a safety mechanism designed to stop the user from accidentally logging off without saving their settings.
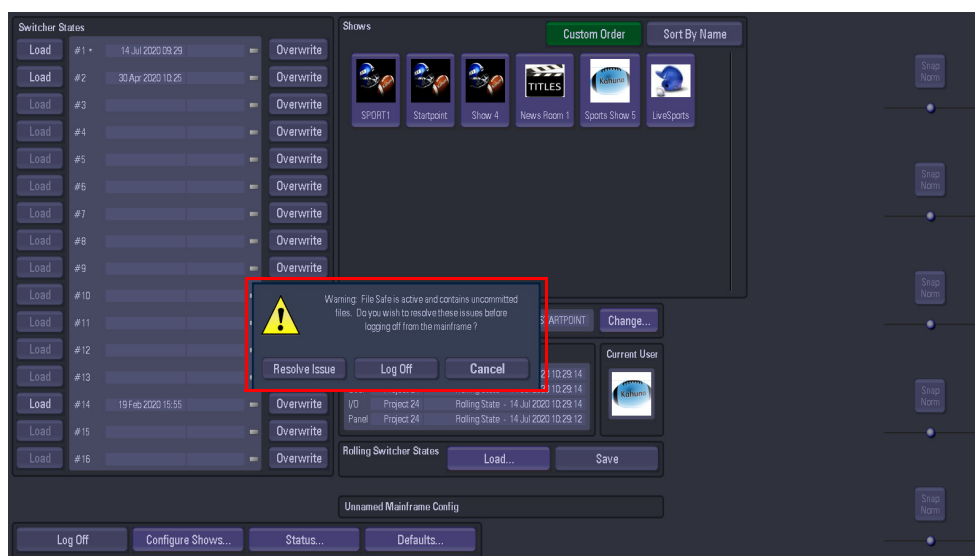
The "**Log Off**" dialog box may display a warning about "**Uncommitted Files**". This is because changes have been made to the original setup of the project you are currently in. You can resolve this by going into the "**Filing Sys - Projects**" menu and either revert back to the saved state of the project or committing the project to the current state.

Color Correction

Crosspoint, Bus and Output Color Correction

Crosspoint Correction applies color adjustments, aspect adjustments (FormatFusion[TM]) to individual crosspoints. Bus Correction, which applies adjustment to a whole bus, so that all sources receive the same amount of adjustment. Output Color Correction will apply a Color Correction individual outputs.

> Note: All the functions mentioned above are saved in the User Config and are accessed via the GUI using the **Source** menu buttons as shown below, outlined in Red

Crosspoint Correction

Crosspoint Correction is comprised of two functions within one menu and incorporates:

- **Color Correction** - color correction for individual crosspoints.
- **FormatFusion** - utilizing the FormatFusion3[TM] and FormatFusion[TM] engines to change the aspect ratio of a crosspoint source.

The above functions are applied on a crosspoint by crosspoint basis, and are saved when saving a User Config, so it is important to check that any work done was created in the required User Config before saving.

Color Correction Controls

FormatFusion Controls

Color Correction

The color correction part of the menu allows the user to change the color balance on each individual crosspoint, there are 4 types of control, YUV, RGB, Bleed and Preset.
To use the color correction options, press the **{Color Correction}** button in the main menu and the button will go Green.

Xpt Color - YUV

Press the **{YUV...}** button to enter the **User Config - Xpt Color - YUV** menu.
The **Main** attacher displays the selected Crosspoint, the name of the Source on the Xpt, and
the name given to Xpt.
The attacher also displays the On/Off status of the YUV Control, RGB Control and the Bleed
Control.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments
made to a Xpt will be turned Off; but not lost, they will all become active again when the Color
Correction button is turned On.

Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and
Saturation of the Xpt can be adjusted.

- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn
Orange and the percentage of adjustment is shown.

Xpt Color - RGB

Press the **{RGB...}** menu button to enter the **User Config - Xpt Color- RGB** menu.

Here again, a crosspoint can be selected, the source is also displayed. The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time. When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.
Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas.

Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

Bleed Menu

Color bleed is a situation where a single color will over power the other colors in the RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.

Again make sure the Source Correction is turned on.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attacher to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a - 100% to a +100% scale. Each parameter menu will adjust a single color, i.e. red into red, green into red and blue into red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

Presets

Presets allow the user to quickly select commonly used preset color options for the crosspoint source, or quickly revert back to the original crosspoint source color levels.

Normal - is the original color levels of the crosspoint source; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original crosspoint source can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

FormatFusion™

The FormatFusion controls in this menu allow the user to change the aspect ratio, zoom and position of a crosspoint source.
This function would most commonly be used to change the aspect ratio of a 525 or 625 4:3 source to a 16:9 aspect ratio, using the Kahuna FormatFusion engines.

Original 4:3 Crosspoint
Source on a 16:9 background

With Full Width Applied

With Full Height Applied

With Zoom Applied to fill 16:9
Aspect

Aspect Mode has 3 settings: **Zoom**, **Full Width** and **Full Height**.

The **Zoom** parameter allows the crosspoint source to be zoomed out to fill the 16:9 aspect, when the source is zoomed to 16:9; it will appear slightly larger. The zoom function will not work if the aspect is set to Full Width or Full Height.
The **Full Width** parameter changes the aspect so that the full width of the 16:9 aspect is filled, in this setting a letter box effect is seen where there are bars at the top and bottom of the image.
The **Full Height** parameter will change the aspect so that the full height of the 16:9 aspect ratio is filled, leaving bars either side of the image.
The **X and Y Position** allow the source to be re-positioned within the 16:9 space.

The **Crop** adjustments allow the user to crop areas of the image that may need to be hidden from view. Adjustments can be made to the **Top**, **Bottom**, **Left** and **Right** of the image.

Pressing the **{Format Fusion...}** button will switch menu's to the **User Config - Xpt Format Fusion** menu.

This menu has all the same aspect ratio parameter controls as in the Crosspoint Correction menu, but has a table that displays each crosspoint and any individual settings made to the crosspoint (as shown above).

Bus Color Effects

The Bus Correction function is used to color correct all sources on a Background or Key Bus, no matter what crosspoint button is selected. The color correction menus; YUV, RGB and Bleed work in an identical manner to the Crosspoint Correction menus in the previous section. The main difference in the Bus Correction menu is the **Bus Color Effects - Curves** menu.

> Note: As Bus Color Effects color correction works in an identical manner to Crosspoint Correction, only the "Curves" menu will be described in this section.

Color Correction
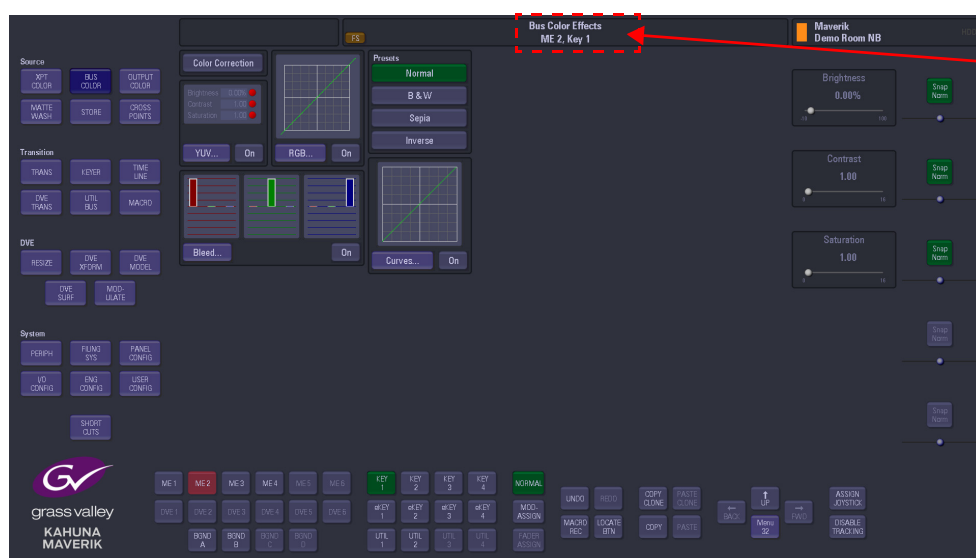
Displays the M/E and Background or Key Bus

> Note: Looking at the menu Title Bar, the selected the selected M/E and the Background or Key Bus can be seen.
> The M/E, Key or Background Bus is selected by using Delegate buttons on the GUI or the Key Control buttons on the Control Panel.

Press the **{Color Correction}** button and this will enable the higher level color adjustment of Brightness, Contrast and Saturation.
Changes made to the Brightness, Contrast and Saturation parameters in the Bus Correction main menu are reflected in the in the YUV and RGB sub menu's.

Bus Color Effects - Curves

The Curves function is used to artistic type effect to the selected Bus. The user can select preset effects such as Solarize and Posterize, and then adjust them to give a user defined effect.
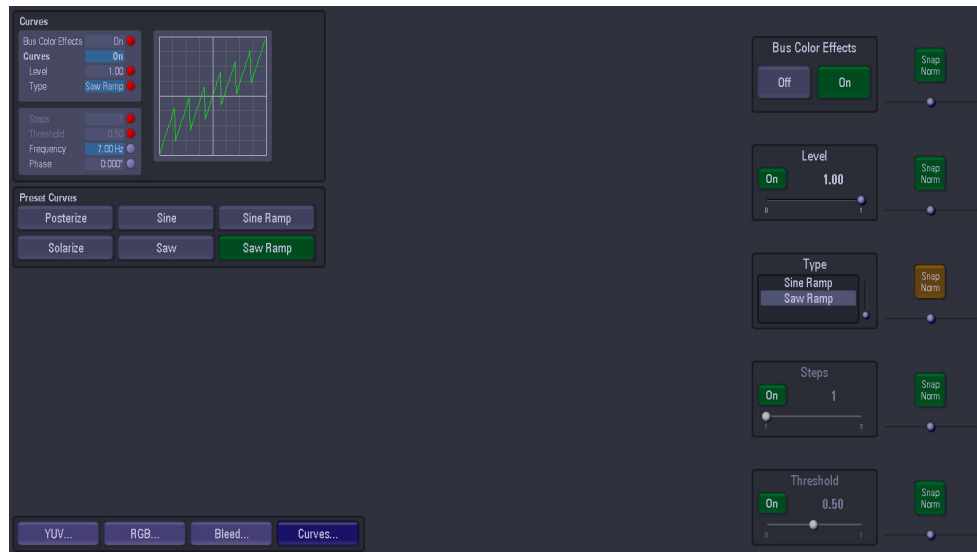
Make sure that the Bus Color Effects parameter is set to On. The user can select from 6 Preset Curve options by touching the button or use the **Type** parameter to select from a list of options.

Touch the top attacher, the **Level** parameter changes the level of effect on the selected Bus, from a normal looking source to an extreme manipulation effect with full effect.
The **Type** parameter as mentioned above selects the type of Curve effect.

In the bottom attacher there are 4 parameters that can be used to modify a selected preset curve, not all of the parameters work with all of the preset curves.
The first parameter is **Steps**; the more steps there are in an effect, the less extreme the effect will appear.
Threshold is used to change the shadow and highlight values of the selected preset curve, **Frequency** determines the number repeated occurrences are applied to the effect. The final parameter is **Phase**, this adjusts the effect starting point within the Step cycle.

Output Color

The Output Correction functions are very similar to the Crosspoint Correction, where the color correction menus work in an identical manner. The exception in this menu is the color correction can be applied to every output.
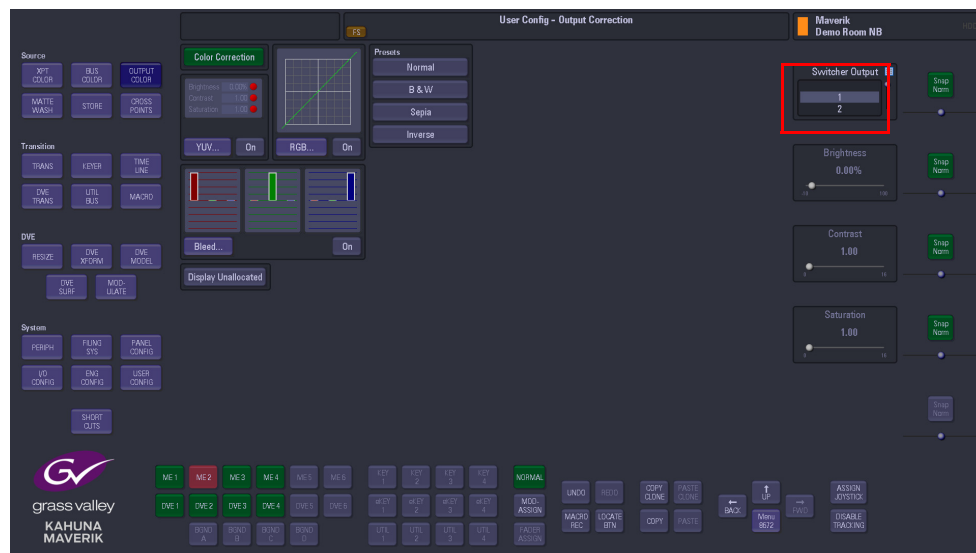
Select the required output using the "**Switcher Output**" parameter, or use the pop-up selector. At the top of the menu, there is an information bar showing the selected BNC output, switcher output, the description given to the output and the source

The color correction part of the menu allows the user to change the color balance on each individual crosspoint, there are 3 types of control, YUV, RGB and Bleed.

To use the color correction options, press the **{Color Correction}** button in the main menu and the button will go Green, notice that the Brightness, Contrast and Saturation parameters are now usable, and can be adjusted for the selected output source.

Note: The selected output is also displayed in the menu title bar.

Display Unallocated - When switcher outputs have been assigned to other **Logical Switchers**, the outputs will not be displayed in the **Switcher Output** parameter, i.e. if output 10 has been re-assigned, the parameter will only display outputs 9 and 11.
Pressing the **{Display Unallocated}** button (the button turns green) will display all switcher outputs including the re-assigned ones.
This allows the user to add color correction to the re-assigned output, but the changes will only be seen when the output has been assigned back to the logical switcher being used.

Engineering Configuration

Engineering Configuration Overview

Touch the **{ENG CONFIG}** button on the GUI panel to enter the Engineering Config menu. In this menu up to 1000 (0 to 999) user specific engineering config files can be saved and is one of the most important menus when setting up Kahuna.

Saved Eng Configs

Current Project

Eng Config Details

Current Eng Config File
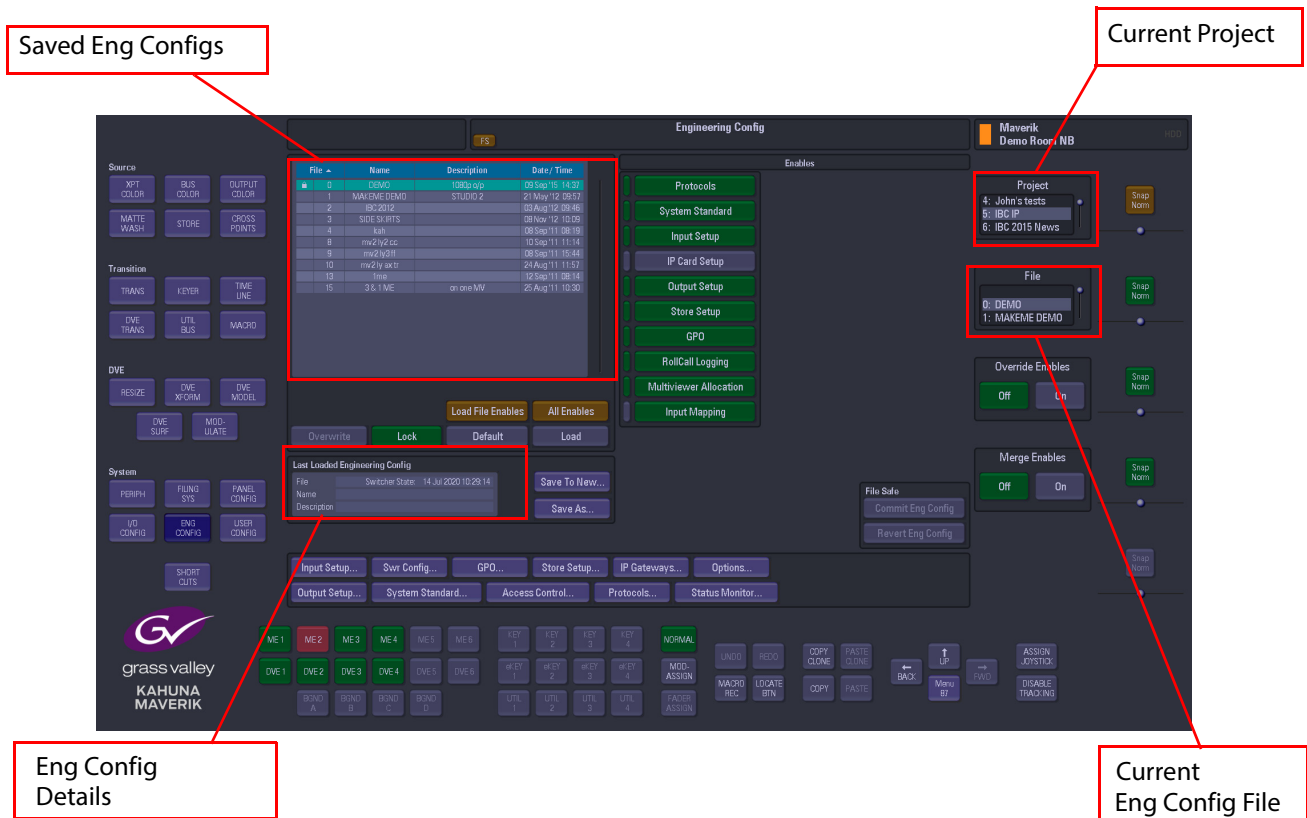
Engineering Config Main Menu Description

The Engineering Configuration is one of 4 main configuration functions on the Kahuna and is a very important part of the overall system setup. In this menu the **Inputs setup**, **Output setup**, **System video Standards**, **Protocols setup**, **GPI/O setup**, **Store setup**, **installing Option files** and **Status Monitoring** are all accessed, so it is important to understand how to navigate the main menu to learn how to Create, Save and Load Engineering Configuration files.

In the Engineering Config main menu, make a new engineering config file or choose a pre-saved engineering config.

Create a New Engineering Config

To create a new config file, you can either touch **{Save To New},** where the Engineering Config file will be saved to the next available slot in the file list, or touch the **{Save As…}** menu link button. Both options will display the "**Engineering Config - Save As**" menu. The menu displays all the saved Engineering Config files within the currently selected "**Project**".
If you wish to change to a different project to save the user config file, use the "**Project**" parameter to select a project, and then use the "**Destination**" parameter to scroll down to an empty row in the table. Use the "**Name**" and "**Description**" attachers with the on-screen keyboard to add a name and description. When finished touch the **{Save}** button to save the new file into the table.

Enables

This menu allows the user to enables/disable certain functions that are related to the Engineering Config setup, such as Protocols, Video Standard, Store Setup, etc. when saving an engineering config file.
The small green tab next to the function enable button will display if a function has been saved with a panel config file or not. If the tab is gray, the function next to it is not included in that saved panel config file. De-selecting an enable will mean the function will NOT be included when saving the Eng Config and subsequently; NO change will be applied to that function when loading that file.
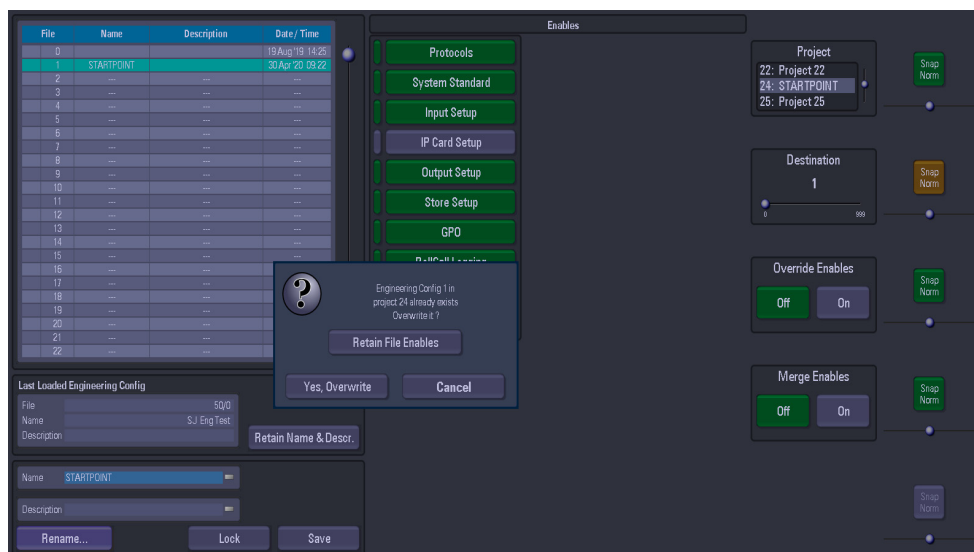
Overwrite - will overwrite the currently selected engineering file.

Lock - will lock out the currently selected file, so it cannot be deleted or overwritten.

Default - will set the selected file to load as default. When set the file number will have an "Asterisk" symbol next to the file number.

Load - will go back to the main Eng Config menu and load the selected/de-selected enables configuration into a configuration selected in the main Eng Config menu table.

Save to New - will make the next empty engineering file slot be automatically selected and saved.

Save As - will open the Save As menu, so that the user can save the selected/de-selected enables into an Engineering Config.
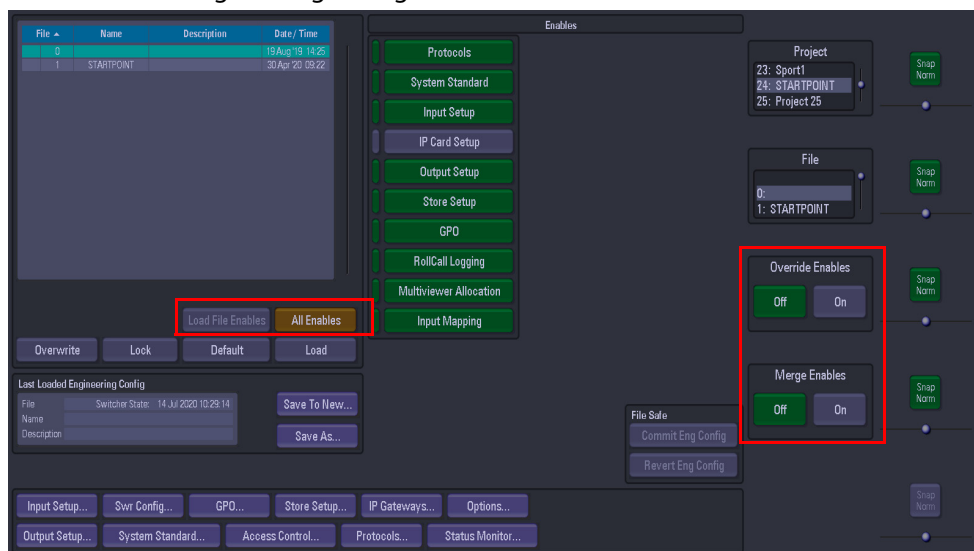
Override Enables - will override any enables that have been de-selected and turn the enable on.

Merge Enables - this function merges the enables currently set in the switcher with the enables saved in the file is being loaded (a 'logical OR' of the enables).

Loading a Pre-saved Engineering Config

Load a pre-saved Eng Config, scroll up and down the File parameter control to reach the required file, then press the **{Load}** button. Pre-saved config files can also be deleted or over written in this menu.

> Note: It is advisable that after any change to a file in the Engineering Config menu, Save the Configuration!

Engineering Config Menus

This section of the menu will cove all of the Engineering config menu's in full. The Kahuna can be thought of as being split into two main user groups; The Basic User, where access to the main user functions such as Stores, Matte's, Washes, Transitions and Timelines etc.
The Engineer User, that has access to all of Kahuna system setup and configuration functionality.

> Note: The Engineering Config menu's will be covered in a specific sequence, it is important to cover the main Input/Output setup and System Standard first (in red below), and then cover all the other menus.

Input Setup

The Input Setup menu has several main configuration functions integrated into one to allow the user to quickly configure each individual input to the mainframe. The user can setup the input standard (if it needs to be different to the System Standard) setup Format Fusion, HDR setup, Color Correction and give the input a unique name.
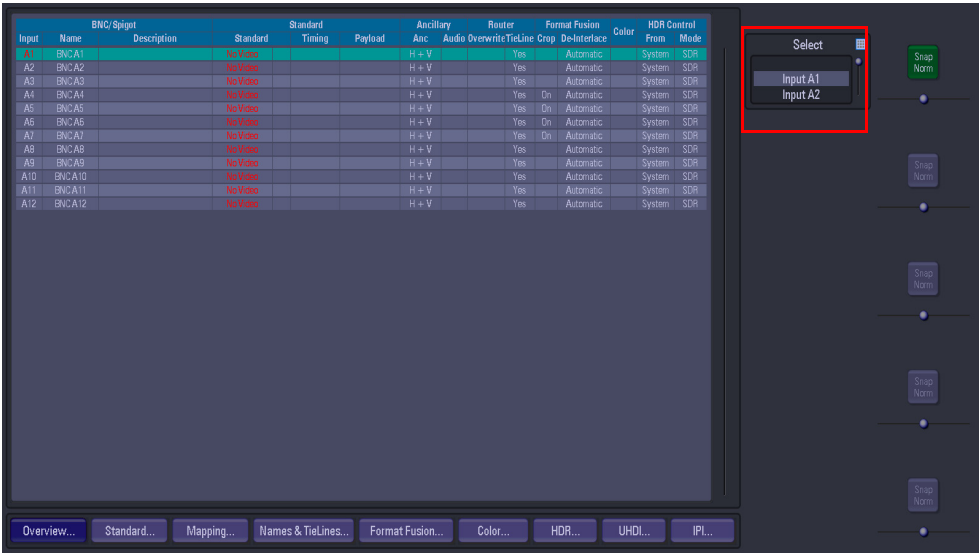
The first menu to be displayed after touching the **{Input Setup}** button is the "Overview" menu. This menu as the name describes, gives the user a complete input overview, displaying BNC/Spigot descriptions, video standard information, ancillary, router and Format Fusion info and HDR information.

Touch the **{Select}** parameter and a popup menu will be displayed, allowing the user to easily select an input.
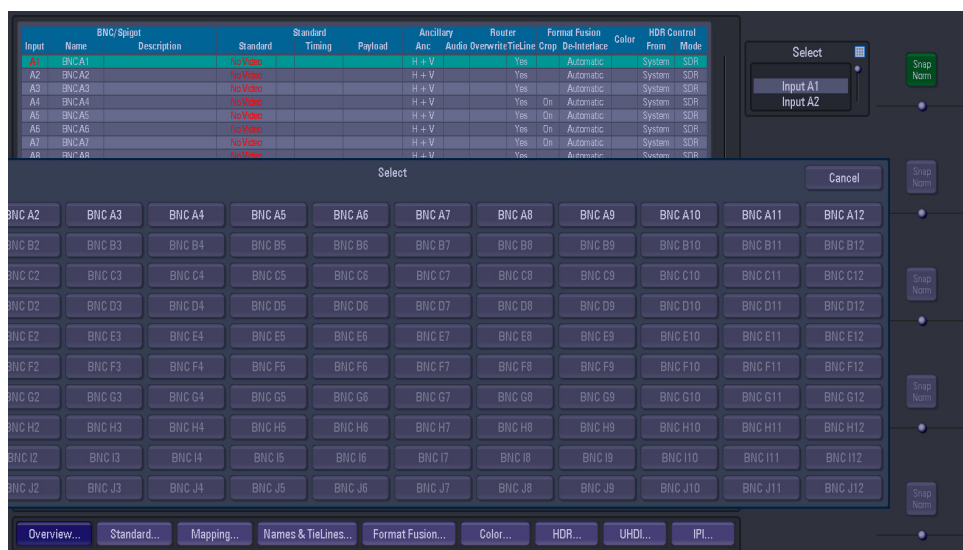
The popup displays inputs A1 to A12 through to J1 to J12, this corresponds to the physical BNC inputs on the Input Fins.
The available inputs will depend on the number of Input Fins fitted to the back of the Kahuna mainframe (in the diagram above, only inputs A1 to A12 are available to use), the inputs that are available to use will light up white.

> Note: A mainframe fitted with 120 Inputs will have A1 to A12, through to J1 to J12 highlighted.

The "**Router Overwrite**" parameter when set to **{Yes}** will allow an externally connected router to rename a source.

Standard - Input Standard

This area of the main menu displays the video standard for the selected BNC. The video standard for the incoming source can be set to the default mainframe video standard, changed to a new standard or using the **{Auto Standard}** button which will allow the system to "auto detect" the incoming source video standard and will keep the original video standard of the incoming source.

The "**Use Default Std**" parameter will force the input source to use the default mainframe "System Standard" which is set in the **Eng Config - System Standard** menu. The Default Standard can be changed by setting the "**Auto Standard**" off (button is gray), the user selectable standards are now accessible. Set the "**Use Default Std**" to "**No**" and then use the "**New Standard**" parameter to scroll through the list of video standards.
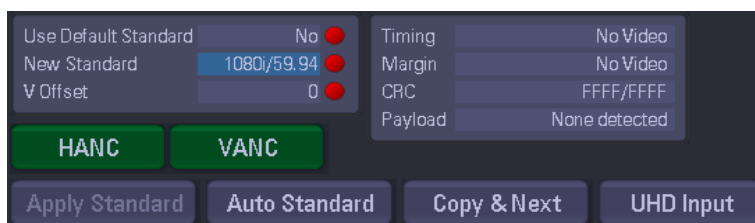
If a new default standard is selected press the **{Apply Standard}** button for the new video standard to be set.
The **V Offset** parameter is used to adjust to the point where active video reaches the bottom line on both fields.

The **Timing** parameter (Timing Reference Signal TRS) This function counts the total TRS errors in the last n fields (where n is set by the Error Window control). A TRS is a flag embedded in every line of video, which marks the start and end of the active picture. If the start of the active line is in the wrong place (with respect to the selected video standard for that source) then this is registered as a TRS error. So again this indicates a problem with incoming SDI stream, and more specifically, may indicate that it is a different standard to the one selected (e.g. 1080i/60 when the input standard is 1080i/50).

Margin displays how much timing is in hand before a whole frame of delay gets added due to the source being too late. This number will typically be less than 5us and never negative. A whole frame of delay will give 16000us of margin. But if a whole frame of delay is added then there will not be a clean cutting due to this.

The **CRC** parameter (Cyclic Redundancy Check) indicates when there is a problem with an incoming signal, e.g. where the cable is too long or is faulty. For a HD signal only, this function will check CRC errors in the last 'n' field (where n is set by the Error Window control).

Touching the **{Standard...}** button will open the main Input Standard menu, this menu has all the same functionality as the parameters described on the previous page but allows the user to see a range of inputs, the exception in this menu is the Copy & Next button.

The **{Copy & Next}** button is a quick short cut function forcing the switcher to take the name from the incoming Source, and then jumps on to the next Source in the list - this makes naming all of the incoming sources much easier and quicker.
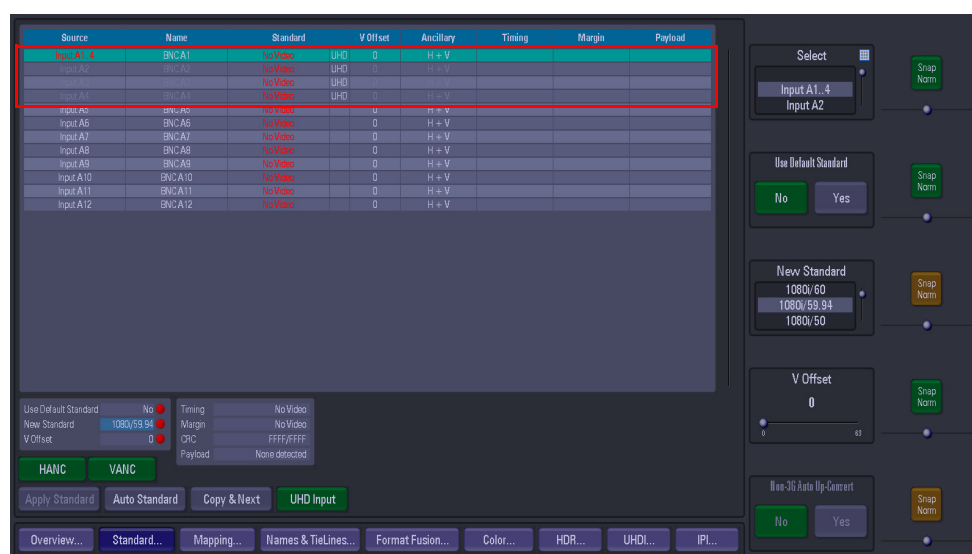
Touching the **{UHD Input}** button will couple four inputs together to create a UHD input. The mainframe inputs are in groups of 12 on each input Fin, up to 120 inputs in total (depending on the system setup purchased). The 4 quadrants of the UHD source have to be connected to consecutive BNCs so that the **System Input** menu can be setup correctly. The UHD quadrants have to be connected in the following order, for example; A1 (top left), A2 (top right), A3 (bottom left) and A4 (bottom right), then the next source A5, A6, A7 and A8 following the same quadrant order. So, the first quadrant of each UHD source is connected to A1, A5, A9 then move on to the next input Fin B1, B5, B9. The first quadrant **cannot** start at A2 or A6 etc...

Ancillary Data - HANC and VANC

The Kahuna is able to receive Ancillary Data to any of the BNC inputs to the mainframe, and pass the ancillary data out from any BNC outputs from the mainframe.
The ancillary data is part of the horizontal and vertical blanking portion of the video signal and is known as **HANC (Horizontal Ancillary Data)** and **VANC (Vertical Ancillary Data),** the portion of the ancillary data we are interested in is **Embedded Audio.**
The embedded audio will usually be in the **HANC** portion of the video signal, and is the most likely way that embedded audio data is received. There can also be other forms of information embedded in the HANC data; such as, SMPTE 352 Payload identifier or SMPTE 2051 two-frame marker.
VANC is also able to carry embedded audio in the form of Dolby E^{TM}, VANC also carries other ancillary data; such as video standard, aspect ratio, content name etc.

Input Standard menu is where each input to the mainframe is setup to receive ancillary data. It is a simple operation where the ancillary data is allowed to pass or is blocked using the **{HANC}** and **{VANC}** buttons.
If the buttons are green, this means that the ancillary data is allowed to pass. The user is able to enable/disable the buttons individually depending on their requirements.

Where Embedded Audio can be used:

The embedded audio can pass directly from input BNC to output BNC, or video containing the embedded audio can be grabbed from a crosspoint into a Store. The software allows just the audio to be grabbed separately from the video. This is setup using the **Grab Crosspoint** parameter in the **Store Grab** menu, where the audio has been setup on a crosspoint and then using the **Grab Crosspoint** parameter on a selected M/E, use the **"Grab Audio"** button to grab the required embedded audio.
The other method of importing video with embedded audio into a ClipStore is using K-Watch application software, in the Filing System Import Export menu.

> Note: The Clipstore ancillary data passes through a Transcoder (the Clipstore embedded audio data cannot take the "Pass-Through" path even if Pass-Through is selected) before being output from the mainframe, the embedded audio data is 8 channel only!

The **Eng Config - Output Standard** menu is where the user sets up the ancillary data to pass out through the mainframe outputs.
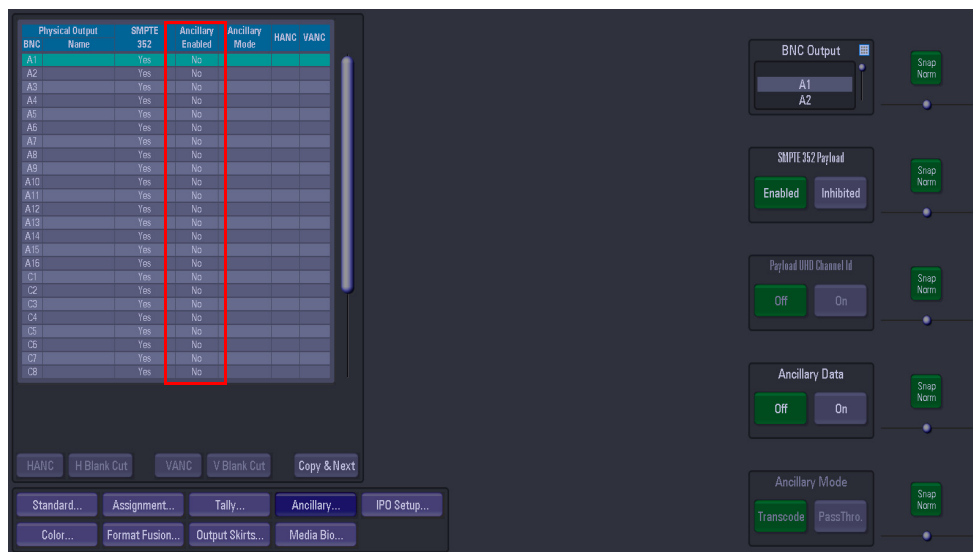
In the **Output Standard** main menu the user is able to turn ancillary data On/Off for each output. To setup ancillary audio for each output, press the **{Ancillary...}** button. More information can be found on this menu and how it works in the **Eng Config - Output Standard - Ancillary Data** menu, which is described later in this section.

Mapping

The Input Mapping menu allows you to share inputs across different logical switchers.
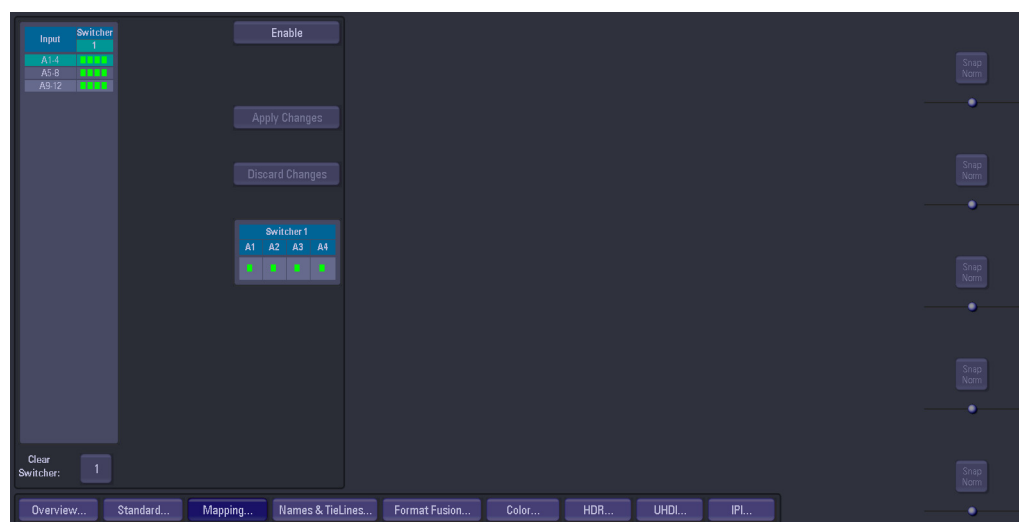
If there are several logical switcher setup in a mainframe, this menu allows you to deselect inputs from one logical switcher and apply them to another.
This will make the inputs dedicated to the logical switcher they are applied to, and the inputs cannot be used by any other logical switcher.

Input Setup - Names and Tielines

The Names attacher allows the user to give all the available inputs a name and description, using the on-screen keyboard.
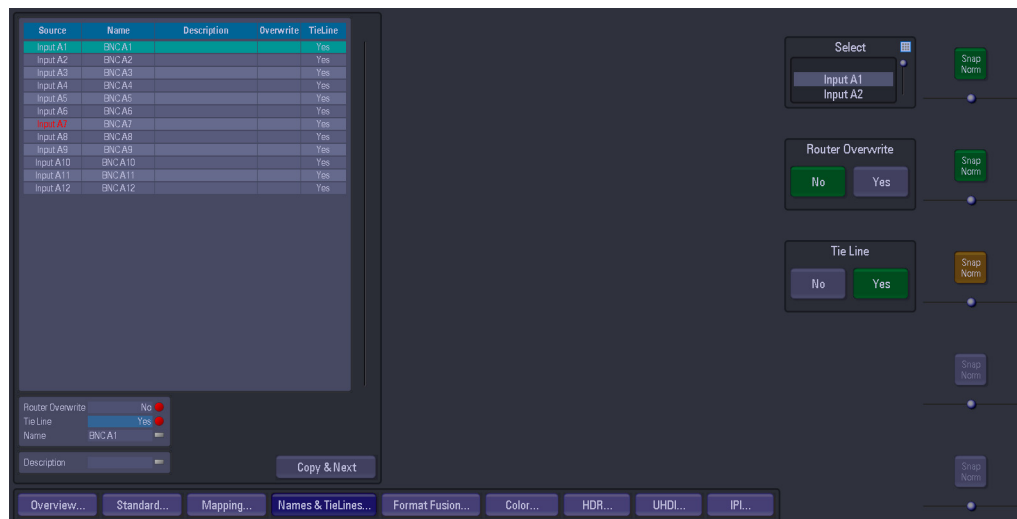
The attacher also displays if **Router Overwrite** has been selected. This will be explained later in the Crosspoint Mapping menu when the "External Router" feature is explained along with how to use Tielines.
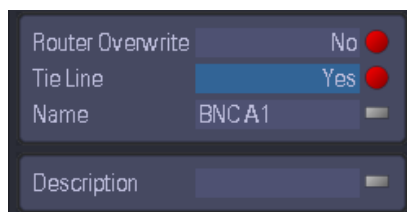
Tie Line - Yes will set the selected input as available to be used if router Tielines ate used.

The **{Copy & Next}** button is a quick short cut function forcing the switcher to take the name from the current Source, and then jumps on to the next Source in the list - this makes naming all of the sources much easier and quicker.

Input FormatFusion^TM

The FormatFusion^TM controls allow the user to change the aspect of an input source, this would be used for example if a portion of an HD source needs to be cropped and stretched to fit a 16:9 format or an SD 4:3 source aspect has to change to fit a 16:9 output.
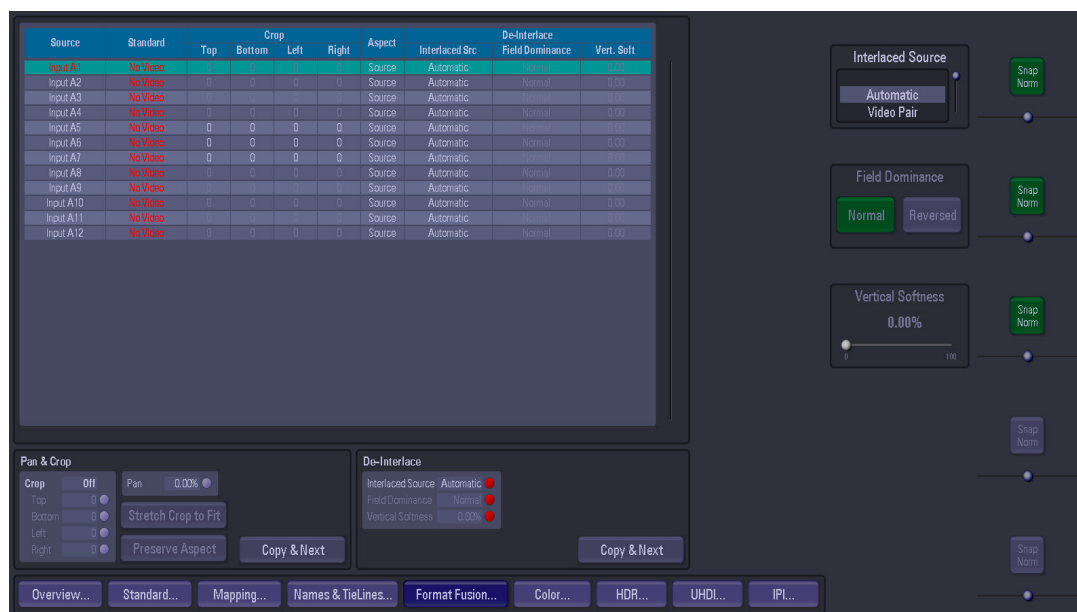
The **"Pan & Crop"** adjustments allow the user to crop areas of the image that may need to be hidden from view. Adjustments can be made to the **Top**, **Bottom**, **Left** and **Right** of the image.
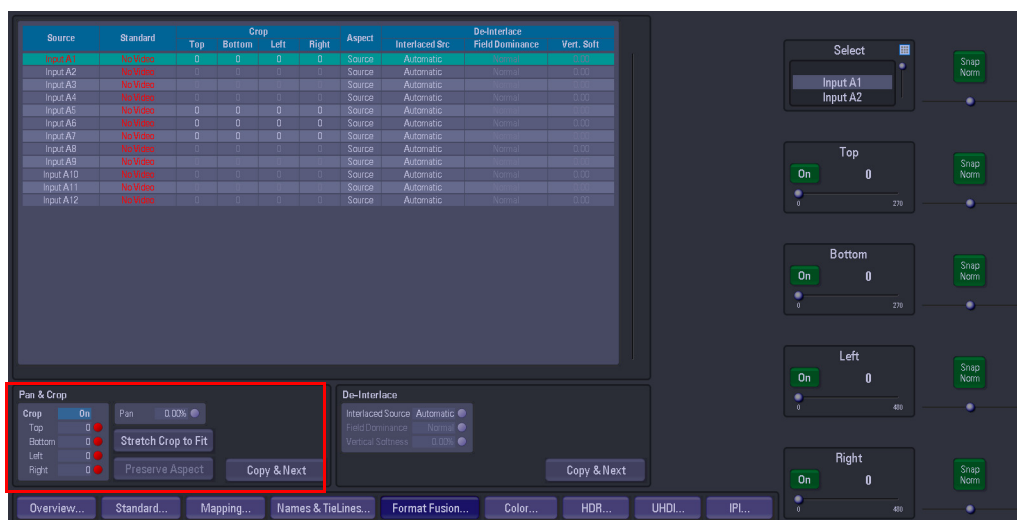
When the **Stretch To Fit** parameter is enabled the cropped picture content will stretched to fill the 16:9 area.

With the **Preserve Aspect** parameter is enabled, this will maintain the aspect ratio of the image e.g. If you crop left and right the image will zoom vertically to compensate. If a source has become very distorted or stretched, this function will adjust the source outwards from the center in all directions creating a 'zoom in' effect.

> Note: This may cause a very small amount of the source material around the edge of the source to be lost.

De-Interlaced Source

A video signal is made up of 2 fields of picture per frame, the first field contains the odd lines of picture and the second field contains the even lines. Each time the switcher creates a new output picture an element of the previous and/or next field is used to fill the missing lines of picture. The Video De-Interlace function will allow the user control over the amount of picture taken from the adjacent fields.

If the source being used contains a lot of movement, e.g. sports, the difference in picture from one field to the next will be more pronounced than if the source is a static shot e.g. studio discussion then the Interlaced Source parameter should be used to compensate for different source types.

The Interlaced Source has 4 parameter settings, these settings are listed below:

Automatic is the default setting for Interlaced Source it is the most suitable mode for live program making. When creating the current field/frame, the automatic setting will use the current input field and a percentage of both the previous and next input fields. Typically used when the output of a camera is fed to the switcher as a continuous stream of footage.

Video Pair is used when creating the current field/frame, will use the current input field and a percentage of either the previous or next field to maintain 1-2 or 2-1 pairing. This could be used for pre-prepared material with cuts on known field boundaries to prevent possible subtle artifacts appearing at cut points.

Film Pair is used when creating the current field/frame, will directly combine the current input field and either the previous or next field. This mode should only be used if the fields are temporarily matched, e.g. PAL film based sources or some animation.

Single Field is used when creating the current field/frame, will only use the current input field.

> Note: Field Dominance and Vertical Softness can only be used with selected Interlaced Source settings.

The **Field Dominance** control selects which field comes first. The **Normal** setting is the default field setting for the input standard, the **Reversed** setting should only be used to correct sources that have incorrect field order (swapped fields). Swapped fields will manifest as very jittery motion.

The **Vertical Softness** control, this feature allows the user to visually "soften" the source on the selected input. Generally, this control is not required and should be set to 0% for the best de-interlacing quality. it is de-activated in Automatic mode, the function will work in Video Pair, Film Pair and Single Field modes.

> Note: If multiple inputs require the same setup, select the first input, setup the input as required and press **{Copy & Next}** and the next input in the table will have the identical setup.

Input Color

The Input Color menu allows the user to add color correction on each individual input, there are 4 types of control, YUV, RGB, Bleed and Preset. If the input sources are assigned to crosspoints, you will be able to see the color correction being adjusted.

Touching the "Color" attacher will display the Color Correction, YUV Control, RGB Control and Bleed ON/Off parameter buttons. Switching them all to "ON" will turn On the color correction settings for the selected input.
Touch the **{Color...}** button to enter the Input Color menu where each of the color parameters can be adjusted.
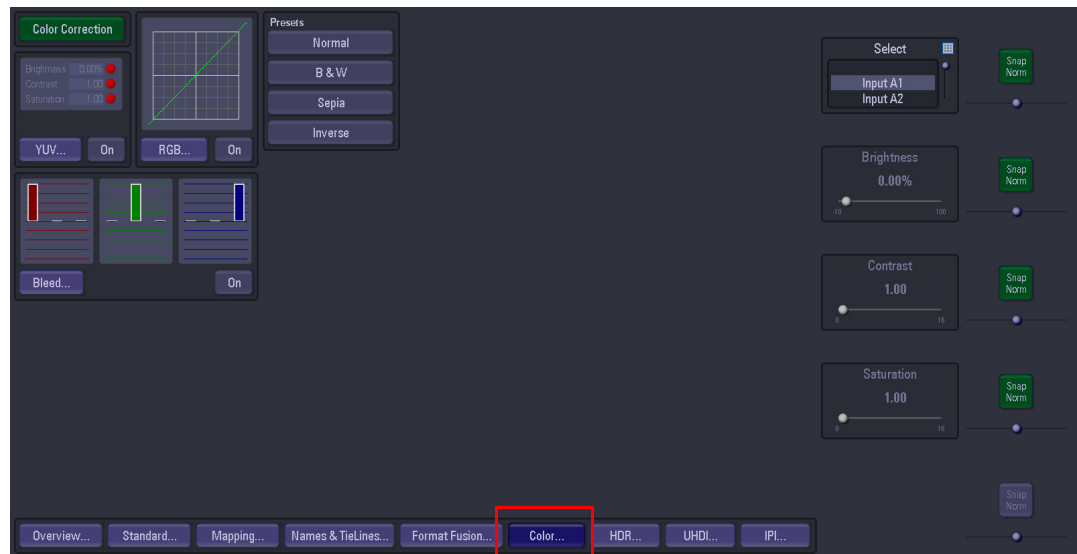
If the color correction settings were turned On in the previous menu then the **{Color Correction}** button in the Input Color menu should be Green.
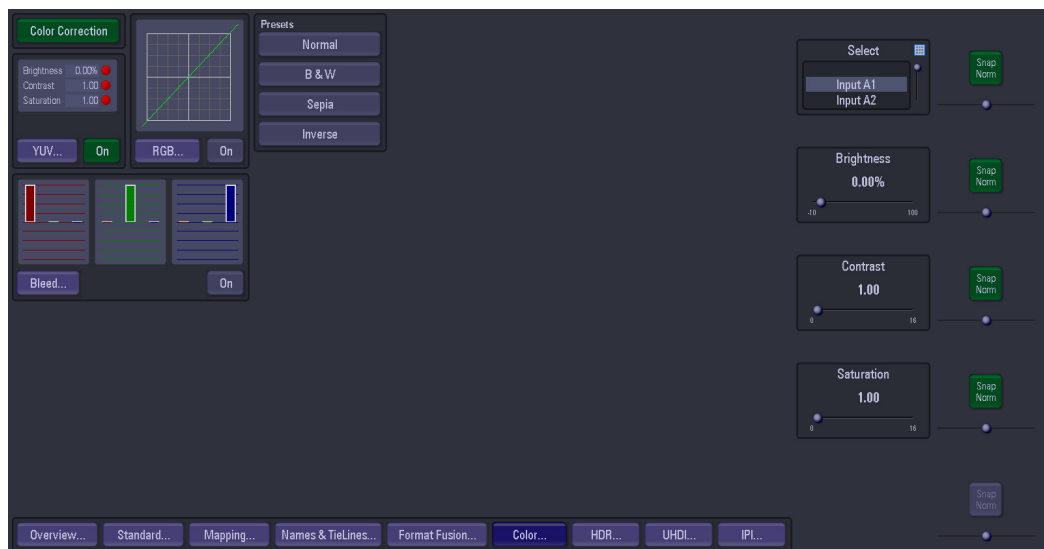
The Brightness, Contrast and Saturation parameters are now available; allowing the user to make high level color correction changes to the selected input source, for more accurate color correction the user will have to go into the YUV, RGB and Bleed menus.

Input Main/YUV

Press the **{YUV...}** button to enter the **Input Main/YUV** menu.
The **Main** attacher displays the selected BNC Input, the name of the BNC.
The attacher also displays the On/Off status of the YUV Control, RGB Control and the Bleed Control. Turn the YUV, RGB and Bleed ON/OFF using the parameter controls.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments made to an input in the Input Color man will be turned Off; but not lost, they will all become active again when the Color Correction button is turned On.
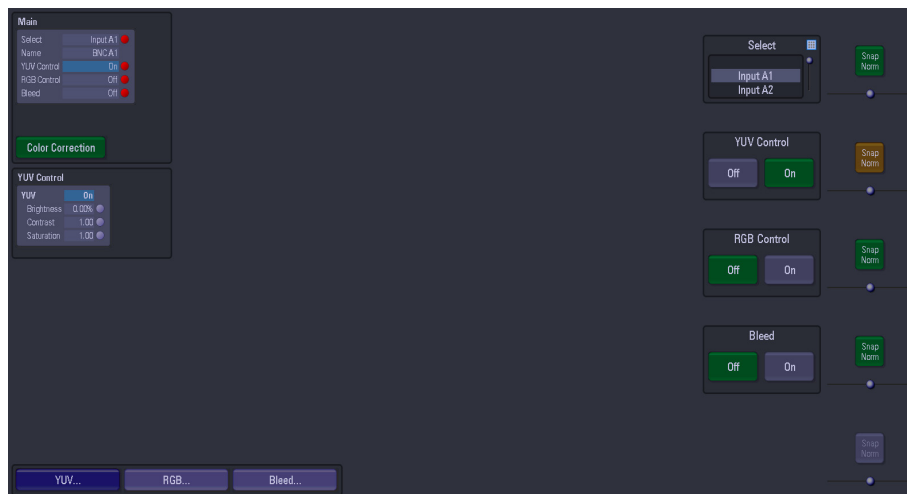
Use the **"Select"** parameter to select the input that you want to color correct.

Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and Saturation of the Xpt can be adjusted.
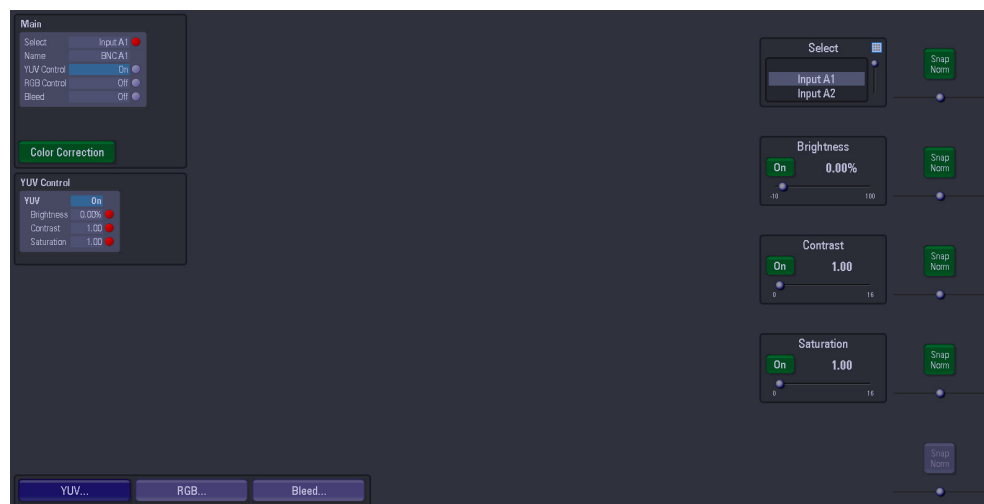
- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn Orange and the percentage of adjustment is shown.

Input RGB

Press the **{RGB…}** menu button to enter the **Input RGB** menu.

Use the **"Select"** parameter to select the input that you want to color correct. The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time.
When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.

Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas.

Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

Input Bleed

Color bleed is a situation where a single color will over power the other colors in the RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.
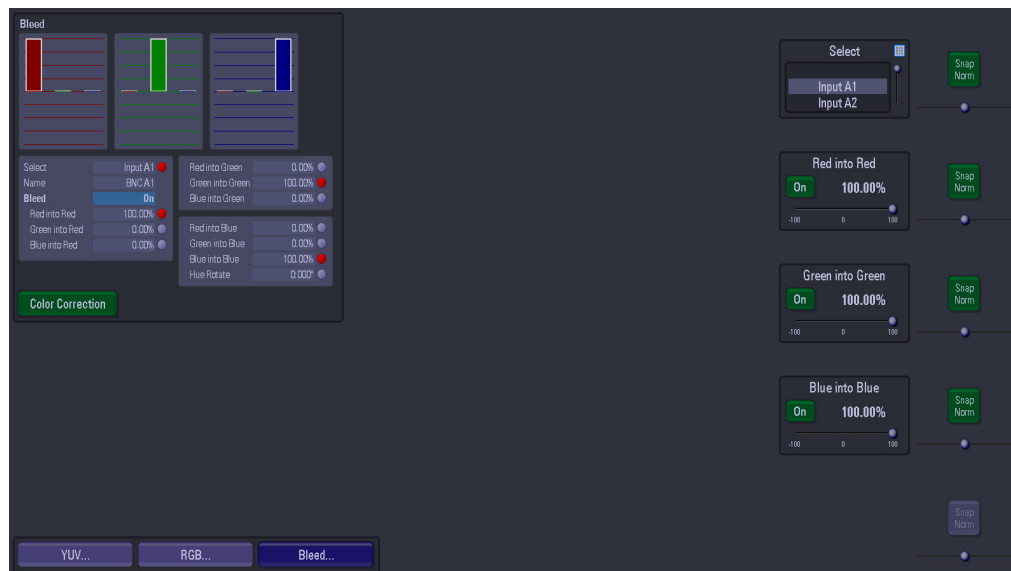
Again make sure the Color Correction is turned on.

Use the **"Select"** parameter to select the input that you want to color correct.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attacher to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a -100% to a +100% scale. Each parameter menu will adjust a single color, i.e. red into red, green into red and blue into red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

Presets

Presets allow the user to quickly select commonly used preset color options for the input source, or quickly revert back to the original input source color levels.
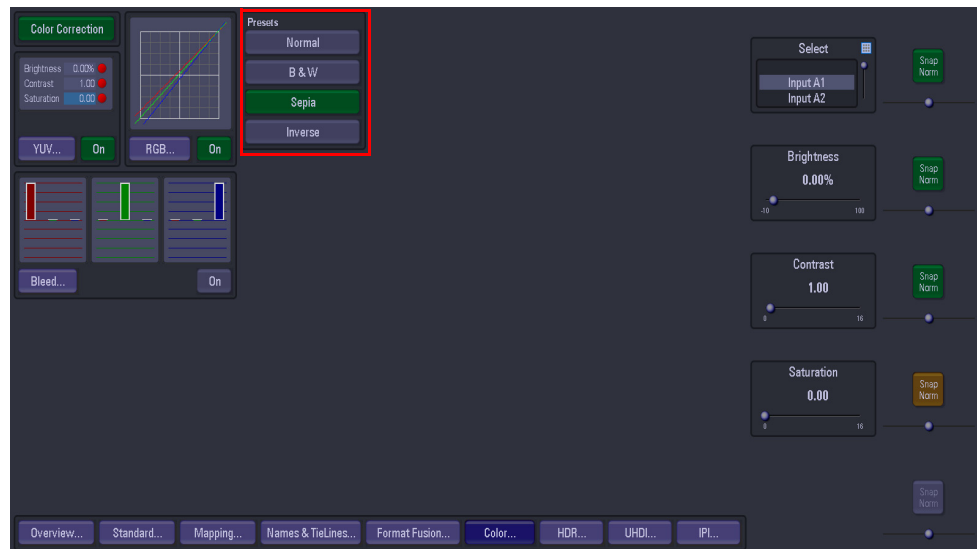
Normal - is the original color levels of the input source; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original input source can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

HDR

HDR (High Dynamic Range) is the ability to display a wider and richer range of Colors, much brighter whites, and much deeper, darker blacks. This gives the video content a more 'dynamic' look, which is where the name comes from.
HDR content preserves details in the darkest and brightest areas of a picture that are lost using older standards like Rec.709. It also allows for more natural, true-to-life Colors that are closer to how we see them in real life.

Note: For a full explanation of the HDR functions, please see the HDR chapter in this User Manual.

UHDI

Note: Before using the UHDI menus, inputs in the "Engineering Config - Input Setup" menu have to be changed to the UHD standard, so that inputs 1, 5, 9, 13 etc. can be used with the UHDI input Fins.

The Kahuna input and output menus when set to UHD mode will see the total number of UHDI/UHDO Fins fitted to the mainframe, which will also display the number of inputs and outputs available to the user. The setup of inputs to outputs is done in the same way as setting up for UHD.

Touch the **{UHDI...}** menu link button.

Note: The UHDI menu will only be active if the UHDI Fins are fitted to the Kahuna mainframe.
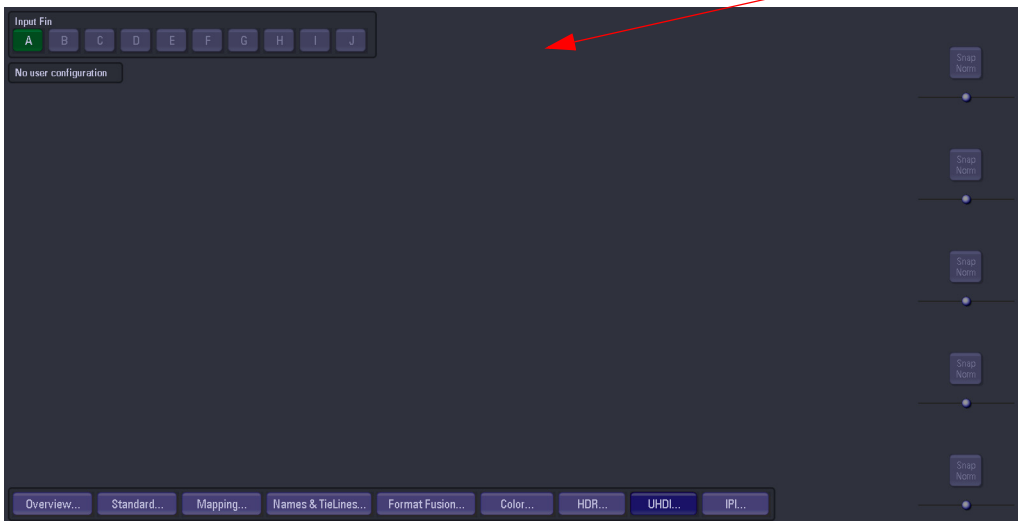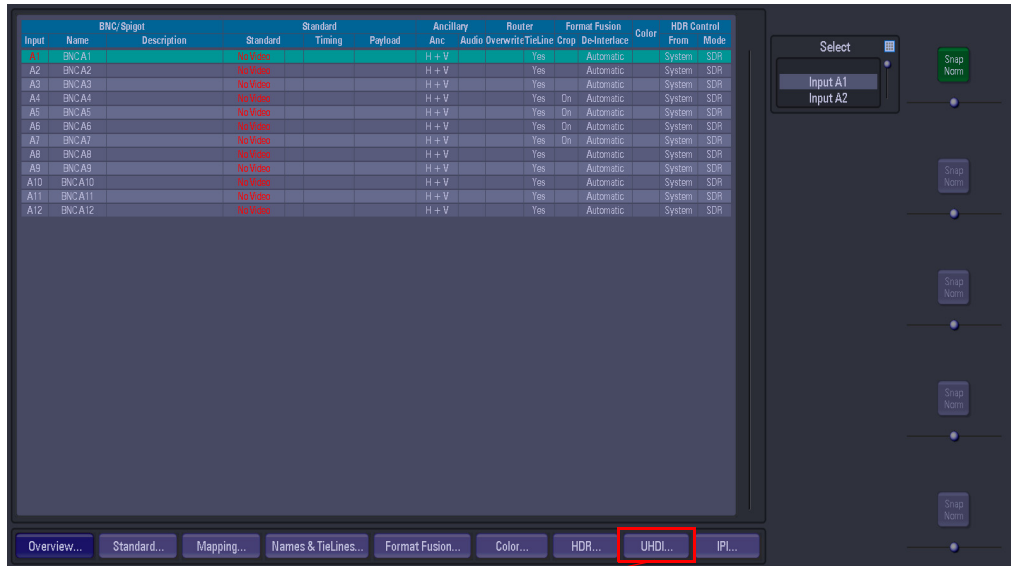
Using the menu is straight forward. Select the Input Fin A to J, then use the UHDI Fin Setup buttons to select whether the input is on the SFP or BNC for inputs 1 to 3 for each UHDI input Fin.

UHDI (12Gbps Input Fin Diagram)

A single UHDI 12Gbps Fin has 3x Inputs and a single 25 Way Tally GPO connector. Inputs are selectable between SDI and SFP via a user menu.

The maximum number of Inputs for **Kahuna 9600** are:

- 30x Inputs total on 10x Fins

The maximum number of Inputs for **Kahuna 6400** are:

- 15x Inputs total on 5x Fins

Example of 12Gbps Inputs to Kahuna 9600
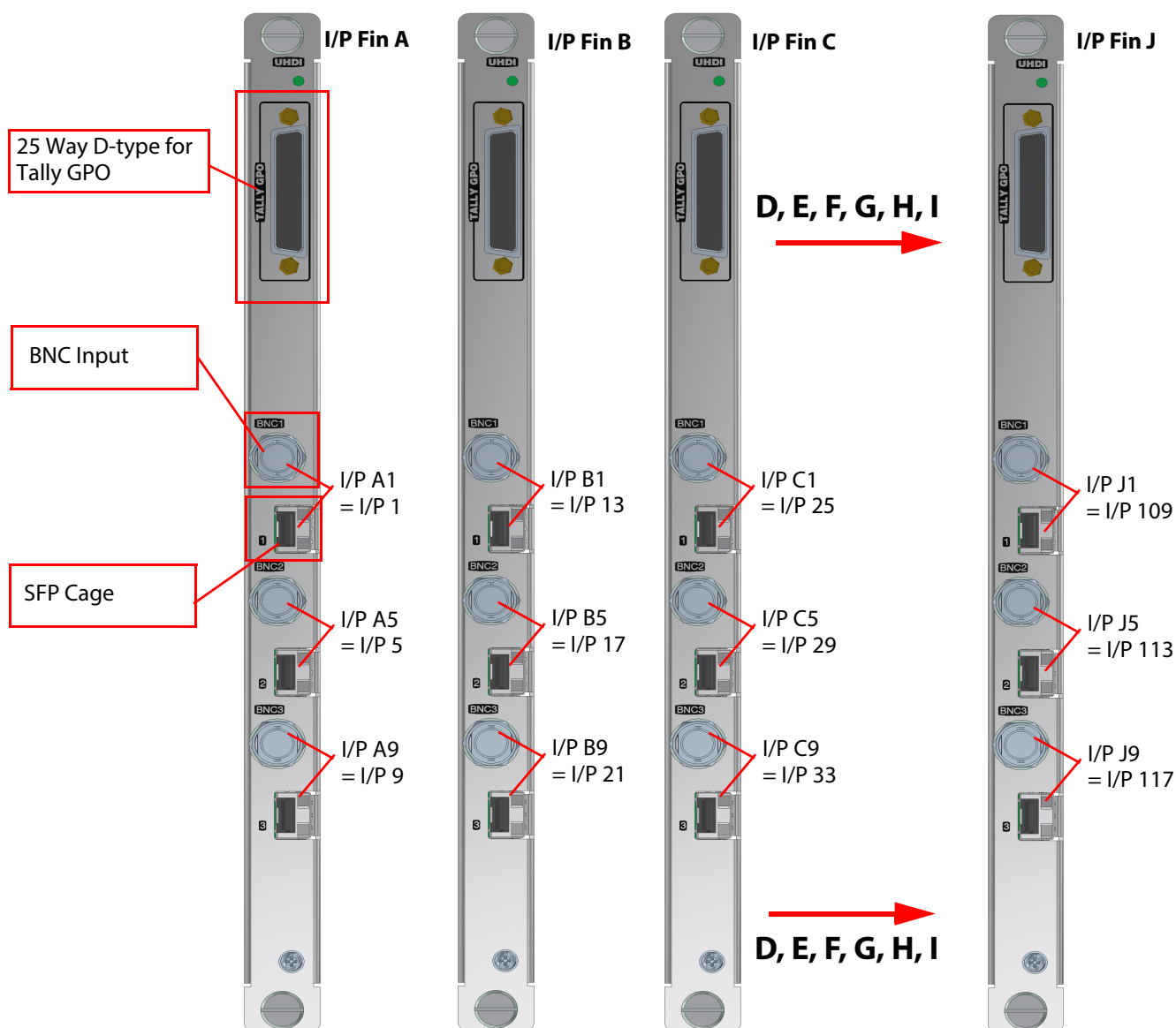
Output Setup

This menu is where each output from the Kahuna mainframe is setup, within these menus the user is able to:

- Name and give a Description to each BNC output
- Change the Video Standard for each BNC output
- Assign each BNC output to different Logical Switchers
- Setup ISO Tally's for each BNC output
- Output Color Correction
- Output Format Fusion

Standard

The first menu to open after touching the **{Output Setup...}** menu link button is the "**Output Standard**" menu. As the name suggests, the user is able to set the required video standard and give a name and description to every output.
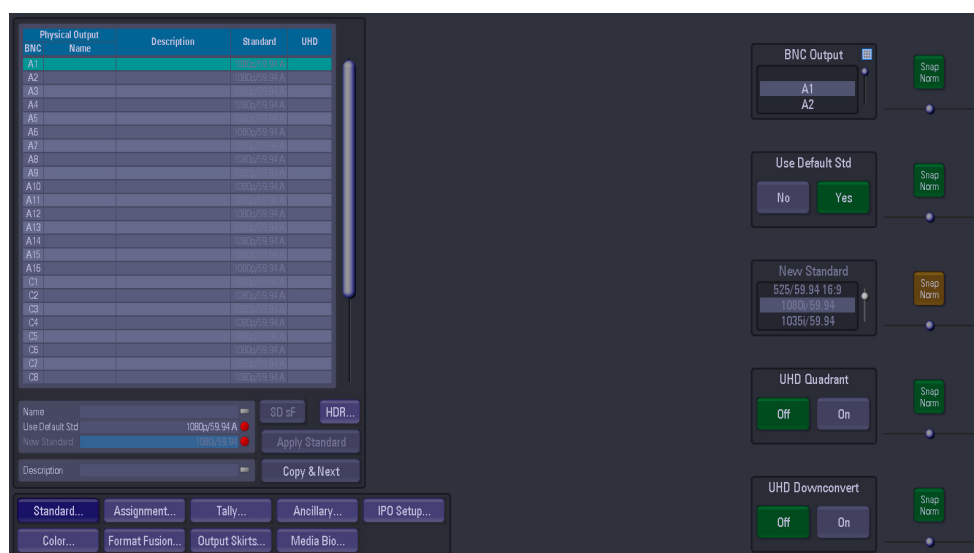
BNC Outputs can be selected using the **BNC Output** parameter or by touching the pop-up selector. Touching the Name attacher a name can be given to the output using the on-screen keyboard.

> Note: Naming the BNC output distinguishes the output and allows outputs to be recognized and selected in other menus such as the User Config menu.

Using the parameter controls, you have the option to stay with the "**Default**" video standard, or by pressing "**No**" in the "**Use Default Std**" parameter, you can now set a new standard for the selected output using the "**New Standard**".

The **{Copy & Next}** button is a quick short cut function forcing the switcher to take the name from the incoming Source and adding it to the output. The function will then jump on to the next output in the list and take the name from the source. This makes naming all of the BNC outputs much easier and quicker.

UHD Quadrant - system will automatically setup the selected output plus the next three outputs to be UHD outputs in quadrant order

UHD Downconvert - this feature basically does what it says. When an output is selected and the UHD Downconvert button is turned "**On**", the system will automatically setup the selected output plus the next three outputs to be UHD down converted at the video standard that has been selected for all 4 outputs. All four outputs must be the same standard.

SD sF - This function is only available when the video standard is changed to an SD standard (488sF and 576sF - 4/3 and 16/9). This function would be used on fast moving video in SD mode, it de-interlaces the video and makes the video frame based with the effect of correcting any interlace problems that can be seen in the video.
The update rate for the SF is still 50 Fields per second but the image has no spatial movement between the two fields, they are temporally matched, hence the term segmented frame. A segmented Frame based image will potentially look better on a computer feed due to the fact that the computer will not have to de-interlace the image (nearly all computer screens are Frame Based).
This is ideally used for video feeds for the Internet, giving a smooth video output.
If the video standard is changed to a HD/1080p, this function will automatically turn off.

Interlaced Source (SD sF Off)
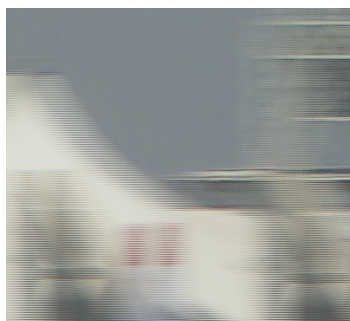
Segmented Frame (sF) based image (SD sF On)

Letterbox - This function is only available when the video standard is changed to an SD standard. It changes the aspect ratio of the picture to a letterbox format.
If the video standard is changed to a HD/1080p, this function will automatically turn off.
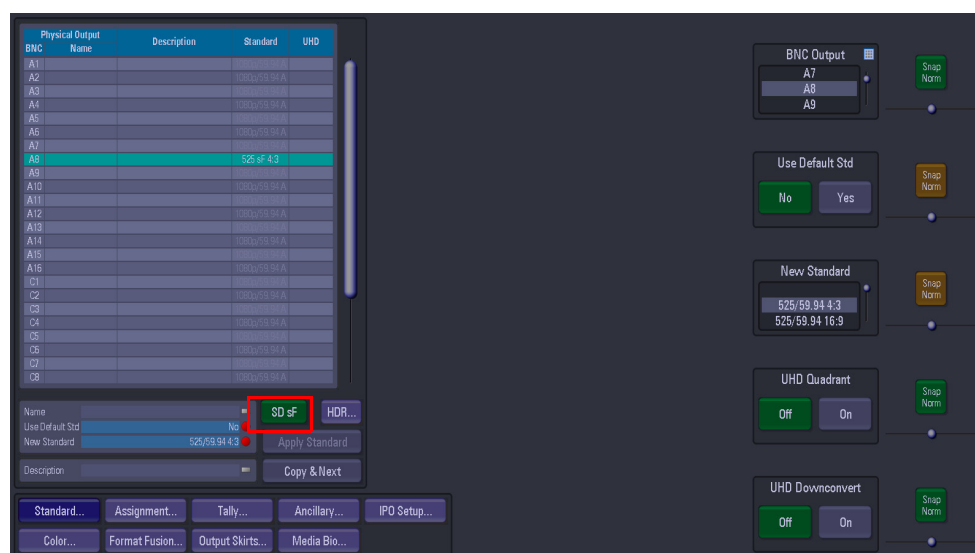
Ancillary Data - All the outputs on Kahuna have the ability to pass audio as well as video, this parameter allows up to 8 channels of Ancillary Audio to pass any of the Kahuna outputs.

HDR

> Note: For a full explanation of the HDR functions, please see the HDR chapter in this User Manual.

Assignment

The Assignment menu allows the user to assign outputs to a logical switcher or switchers as required.
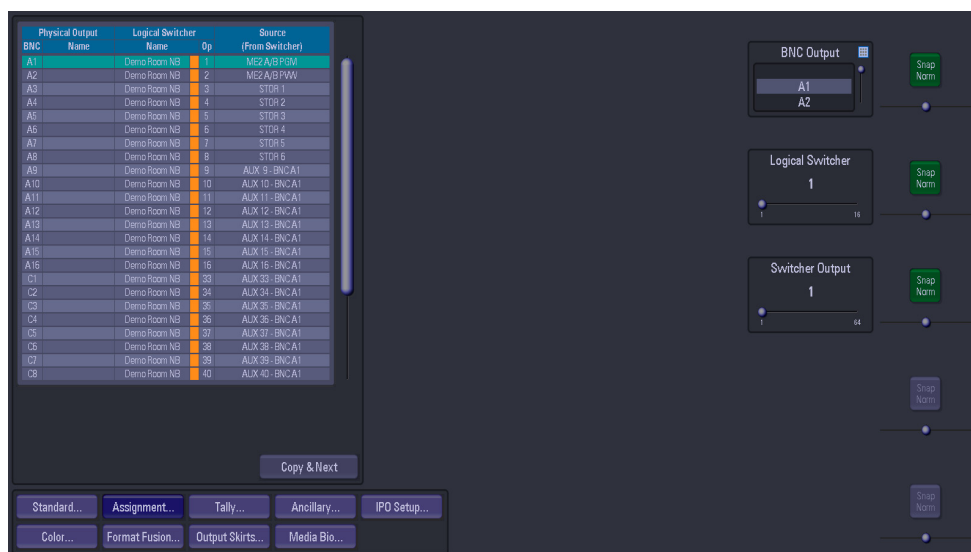
Use the **BNC Output** parameter or pop-up to select an output, then using the **Logical Switcher** parameter select the logical switcher that the output is to be assigned to. Finally use the **Switcher Output** parameter to assign an output to a logical switcher.

Tally

Tally Now sets the tally for an for On Air Sources and will display as a red tallied button/s on the control surface. **Tally Next** - This sets the Tally for the next on air source.
The table shows the current state of all the BNC Outputs. Each column display the Tally options of each output, this defines what tally is assigned to a selected output.
As each attacher is selected, the Tally parameter controls are displayed to the right of the menu, allowing the user to turn the Tally On or Off.
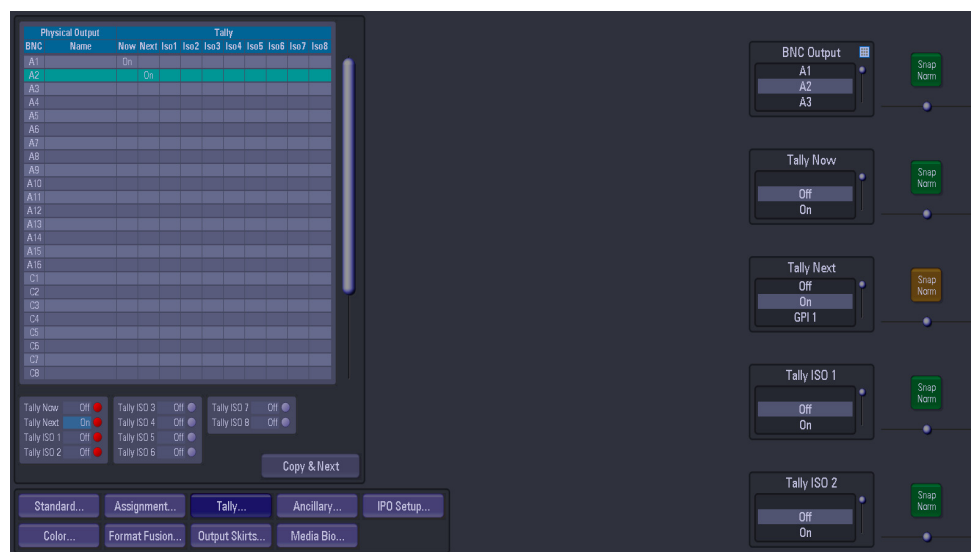
The GPO Tallies can be set to provide up to 8 further output Tallies ISO1 to ISO8. These can be used to Tally outputs that are being used as ISO (isolation) Feeds.

ISO Tally's can be used for example in a studio situation where studio cameras are recording live and/or live to disk or tape, the ISO tally can be used to signal if a camera is live, or recording.
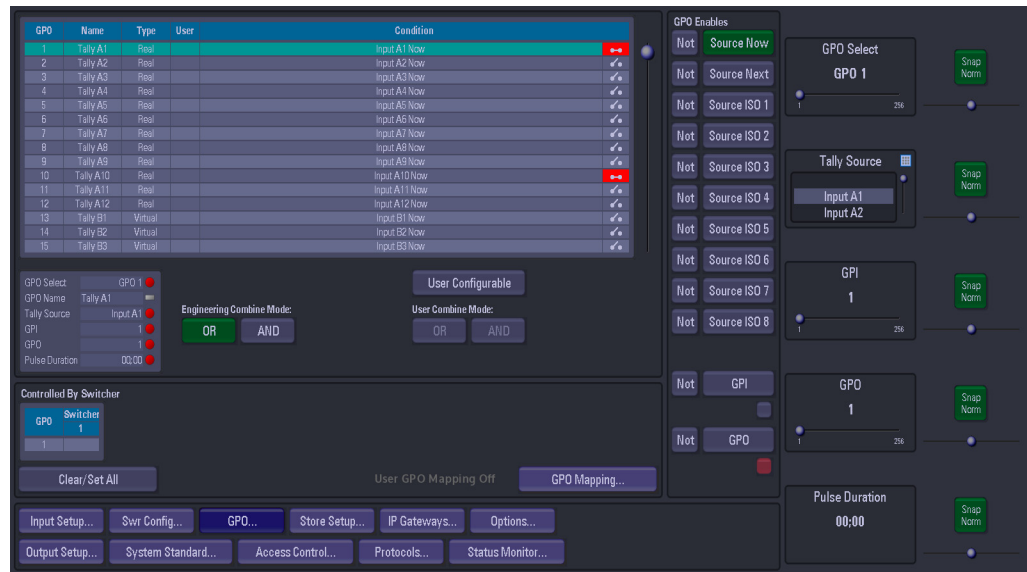
The physical Tally switch is setup in the **Eng Config - GPO Setup** menu, so for example, if BNC Output 1 source is a HD CAM with an ISO1 Tally on GPO 1.
If BNC Output 1 had been set for ISO1 Tally and the HD CAM is the currently selected source GPO 1 will close and the Tally will become active. This can be repeated as required for either ISO tally or required sources.

The ISO Tallies can be "OR"ed or "AND"ed with any other GPO enables to Tallies.

Ancillary Data

As mentioned earlier in the **Eng Config - Input Standard** menu, Ancillary Data can be output from any BNC output on the mainframe. The **Eng Config - Ancillary Data** menu is used to either pass or block the ancillary data on each individual output.

> Note: Please read the **Eng Config - Input - Standard Ancillary Audio** section before proceeding any further.

As with all inputs to the mainframe, HANC and VANC can be allowed or blocked on each output BNC using the **{HANC}** and **{VANC}** buttons.
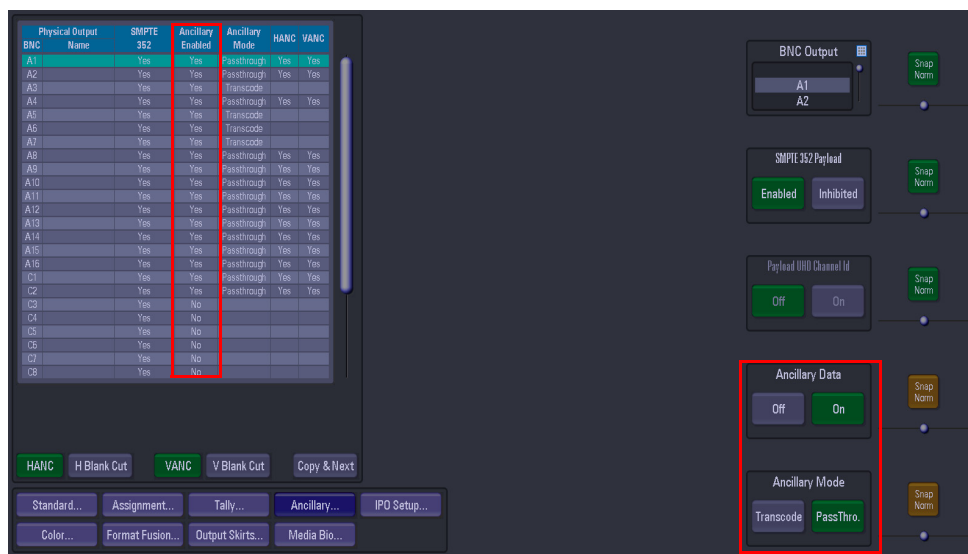
SMPTE 352 Payload - this parameter specifies a "payload packet" which can be included in a serial stream as ancillary data, this indicates such things as the video standard, picture rate, aspect ratio etc. of the video signal that stream carries. The button turns it on and off on each output. It's main use in a studio is to indicate whether SD is 4:3 or anamorphic (i.e. compressed) 16:9.

Ancillary Data - this will allow or block ancillary audio data from passing through the selected output or outputs.

Ancillary Mode - **Transcode** is used to disassemble the audio from an external source or Clipstore and re-embed the audio onto an output. The advantage of transcoding is that it does not matter what the source or output video standards are.
The only disadvantage is that it is transcoding is restricts the audio data to 8 channels (from groups 1 and 2). Making an audio cut where the source and output standards do not match, this may not make a clean audio cut.

> Note: The Clipstore ancillary data passes through a Transcoder (the Clipstore embedded audio data cannot take the "Pass-Through" path even if Pass-Through is selected) before being output from the mainframe, the embedded audio data is 8 channel only!

From the Transcoder, the embedded data takes the form of two groups of 4 channels. Each channel is mono and independent. However, the user could set Group 1 CH1 and CH2 for a stereo source and Group 1 CH3 and CH4 for another stereo source. Similarly for Group 2.

The **Pass-Through** mode passes all HANC and VANC data from an input source to an output, if the input and output video standard, and the system video standards match (which defines the Kahuna source cut point), the sources will be correctly timed and the audio cuts will be clean.

Note: If the user has selected Pass-through mode on an output and selects a Clipstore as a source, the Kahuna automatically uses transcode mode. Clipstores generate audio in an internal format, so must be transcoded.

UHDO (12Gbps Outputs)

> Note: Before using the UHDO menus, outputs in the "**Engineering Config - Output Setup**" menu have to be changed to the UHD standard, so that outputs 1, 5, 9, 13 etc. can be used with the UHDO output Fins.

There is no menu to setup the UHDO Fins. The Kahuna input and output menus when set to UHD mode will see the total number of UHDI/UHDO Fins fitted to the mainframe. Each UHDO Fin has 4x BNC and 4x SFP cages for outputs. Only the SDI or the SFP can be used for a single output, i.e O/P1, not both.

The maximum number of outputs for **Kahuna 9600** are:

- 16x Outputs total on 4x Fins

The maximum number of outputs for **Kahuna 6400** are:

- 8x Outputs total on 2x Fins

Example of 12Gbps Outputs on a Kahuna 9600
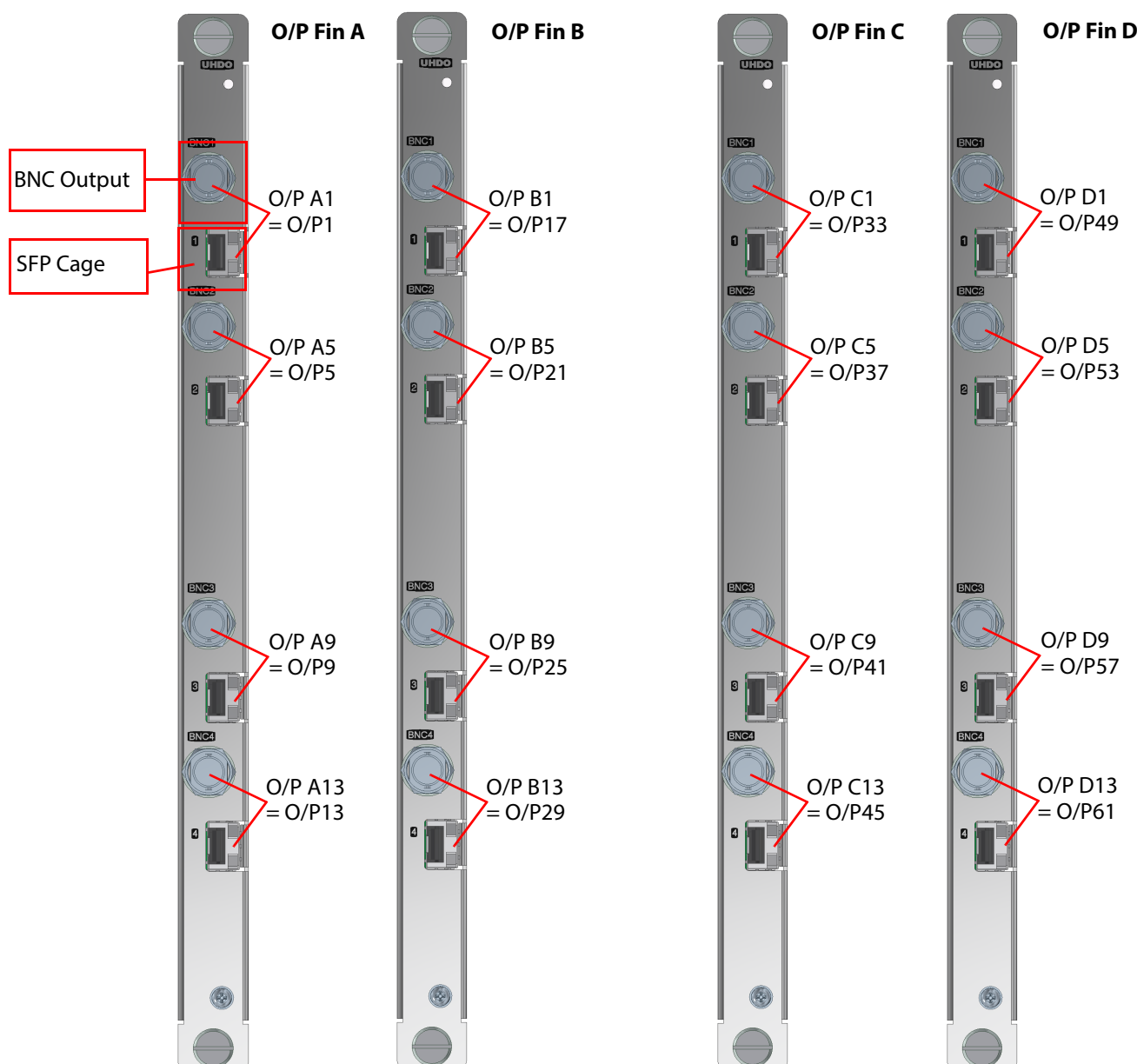
Color Correction

This menu allows the user to add color correct to individual outputs. The menus are very similar to the other color correction menus in the Kahuna software.
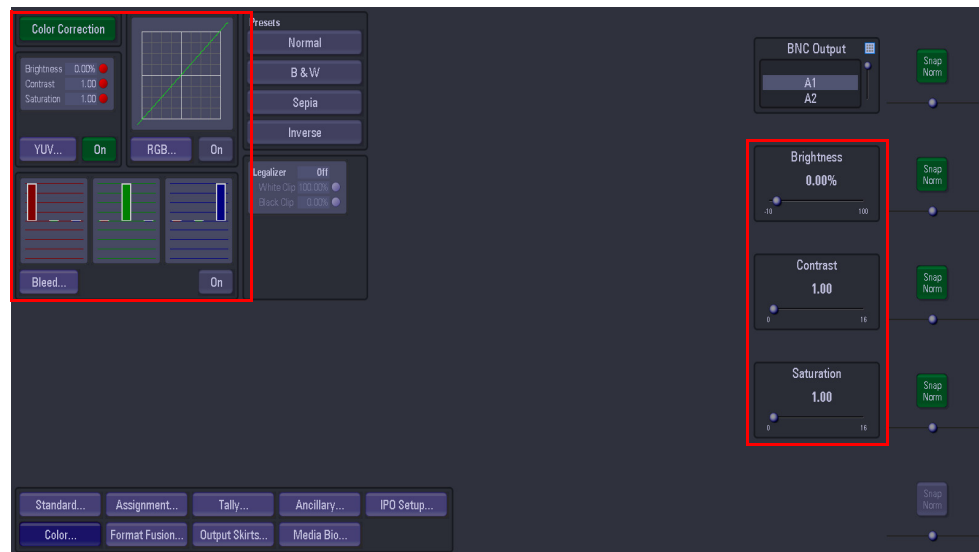
The color correction part of the menu allows the user to change the color balance on each individual crosspoint, there are 3 types of control, YUV, RGB and Bleed.

Select the output you want to color correct using the "**BNC Output**" parameter, then touch the **{Color Correction}** and then the **{On}** button next to the **{YUV}** button. Notice that the Brightness, Contrast and Saturation parameters are now lit, and can be adjusted for the selected output source.

> Note: The selected output is also displayed in the menu title bar.

Preset Buttons allow the user to quickly select commonly used preset color options for the crosspoint source, or quickly revert back to the original crosspoint source color levels.

Normal - is the original color levels of the crosspoint source; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original crosspoint source can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

Legalizer - This attacher will limit the peak white level in a digital video signal and allow an extra portion of black to be added below black level, also known as "**White Clip**" and "**Black Clip**".
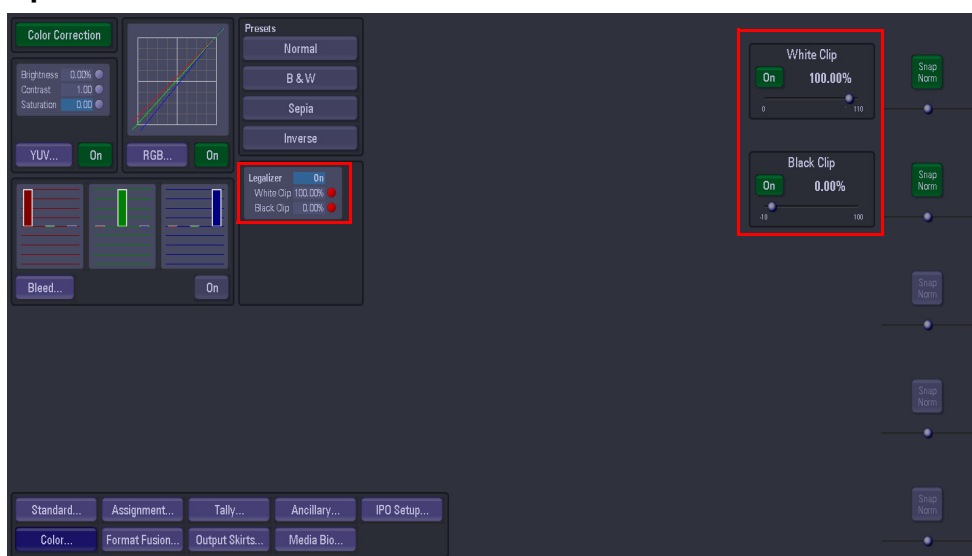
Output Color - YUV

Press the **{YUV...}** button to enter the **Output Color - YUV** menu.
The **Main** attacher displays the selected BNC Output. The attacher also displays the On/Off status of the YUV Control, RGB Control and the Bleed Control.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments made to an output will be turned Off; but not lost, they will all become active again when the Color Correction button is turned On.
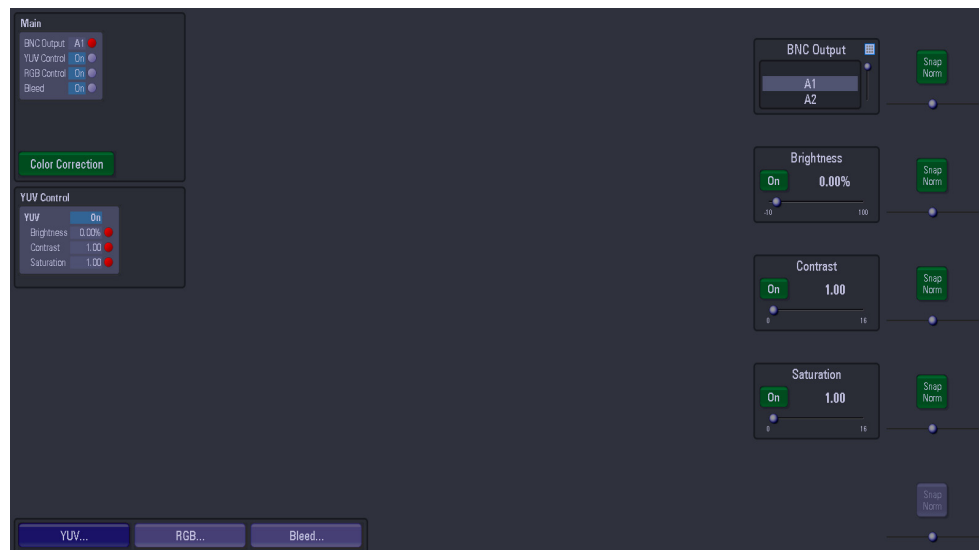
Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and Saturation of the Output can be adjusted.

- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn Orange and the percentage of adjustment is shown.

Output Color - RGB

Press the **{RGB…}** menu button to enter the **Output Color - RGB** menu.

The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time.
When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.

Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas.

Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

Output Color- Bleed

Color bleed is a situation where a single color will over power the other colors in the RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.

Again make sure that Color Correction is turned on.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attacher to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a -100% to a +100% scale. Each parameter menu will adjust a single color, i.e. Red into Red, Green into Red and Blue into Red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

Format Fusion

This menu is used to change the aspect of an SD source before the source leaves the mainframe through the BNC outputs.
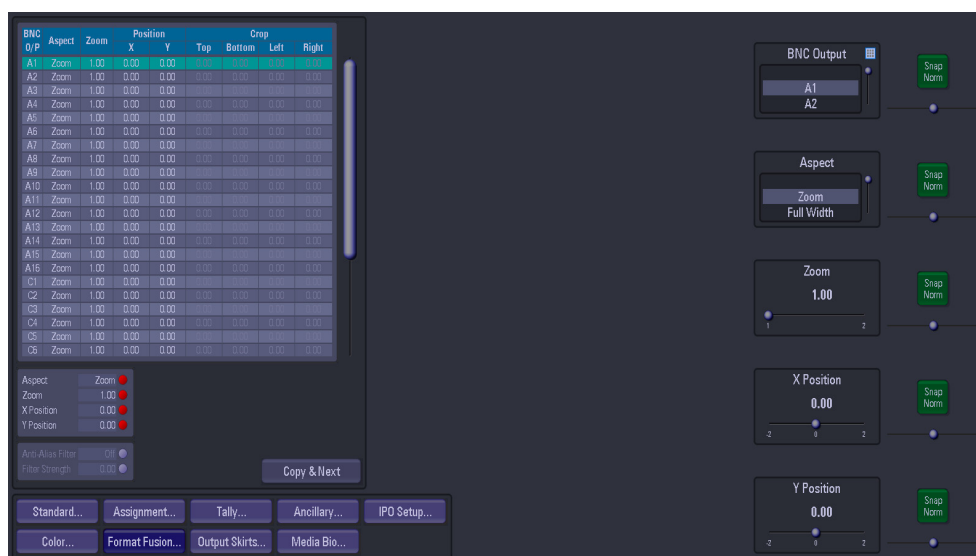
The FormatFusion controls in this menu allow the user to change the aspect ratio, zoom and position of a crosspoint source.

This function would most commonly be used to change the aspect ratio of a 525 or 625 4:3 source to a 16:9 aspect ratio, using the Kahuna FormatFusion engines.
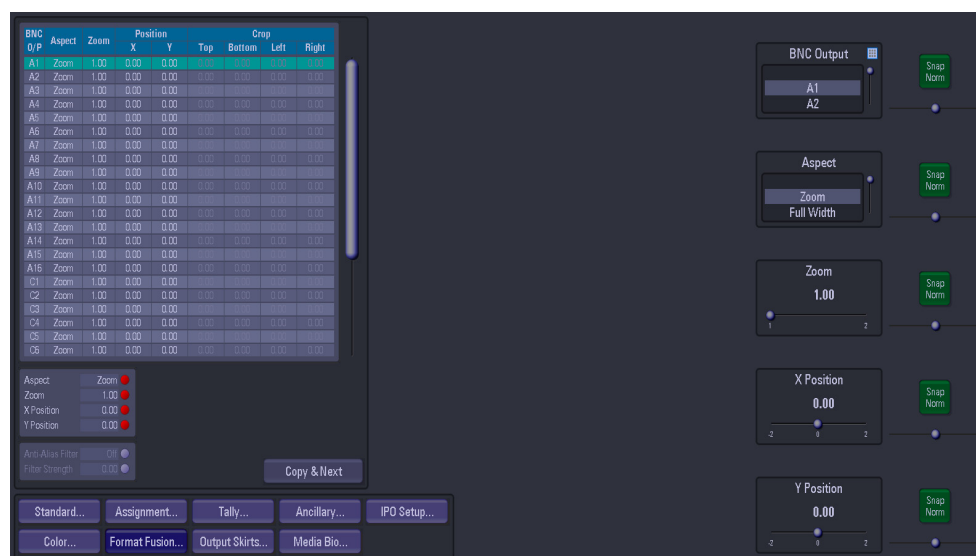
Aspect Mode has 3 settings: **Zoom**, **Full Width** and **Full Height**. The **Zoom** parameter allows the source to be zoomed out to fill the 16:9 aspect, when the source is zoomed to 16:9; it will appear slightly larger. The zoom function will not work if the aspect is set to Full Width or Full Height.

The **Full Width** parameter changes the aspect so that the full width of the 16:9 aspect is filled, in this setting a letter box effect is seen where there are bars at the top and bottom of the image.

The **Full Height** parameter will change the aspect so that the full height of the 16:9 aspect ratio is filled, leaving bars either side of the image.
The **X and Y Position** allow the source to be re-positioned within the 16:9 space.
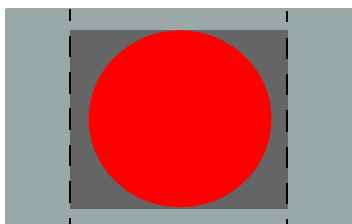
Original 4:3 Source on a 16:9 background
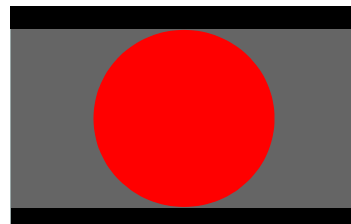
With Full Width Applied
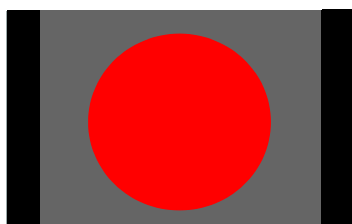
With Full Height Applied
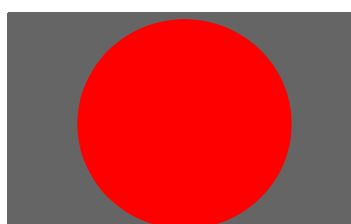
With Zoom Applied to fill 16:9 Aspect
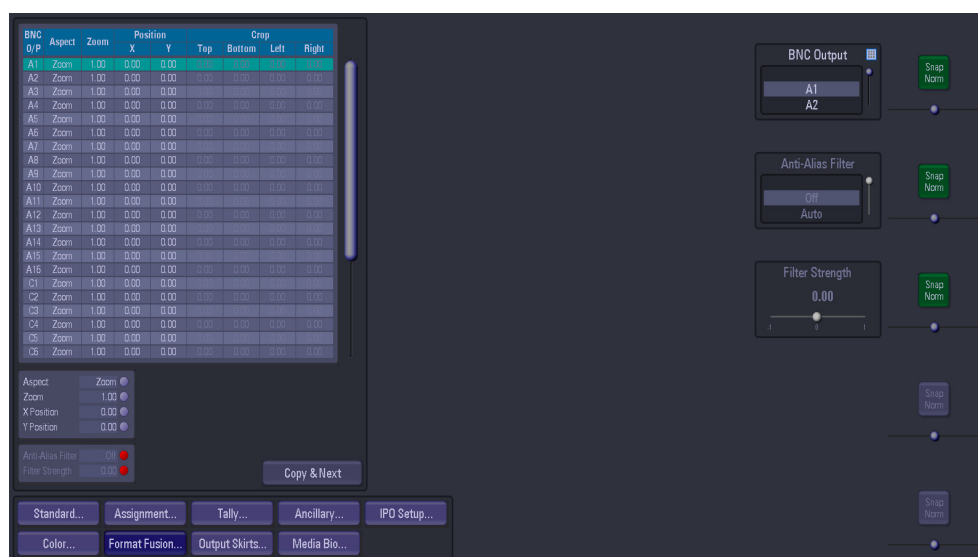
Anti-Alias Filter - is used to vertically soften interlaced outputs. This will reduce line 'twitter' and 'jaggies', replicating the vertical filtering that would normally happen in an interlaced camera. This is particularly useful on SD outputs.

- **Off** - will never apply the filter.
- **Auto** - will apply the filter when the output is interlaced and not the same standard as the input.
- **On** - will always apply the filter.

Filter Strength - 0.0 is the normal amount of filtering but the user can choose a bit more or a bit less than this if required.

Output Skirts

This is the second method of applying Skirts, they are applied to a switcher output, where "Side Skirts" are added to 4:3 sources on a 16:9 output and top/bottom skirts are added to 16:9 sources on a 4:3 output when set to "**Letterbox**" mode.

If a 4:3 source is applied to a 16:9 output, then side skirts will be applied, the side skirts can be filled by entering the **User Config - Skirt Setup** menu.

Use the **Switcher Output** parameter to select the output, then use the **Matte Selector** to select the fill for the side skirts.

Normal Side Skirts Mode

To setup **letterbox mode**, an output from the mainframe has to have its video standard changed to 4:3 in the **Eng Config - Output Standard** menu.

This will allow the user to turn On the **4:3 Letterbox** function in the **Output Skirts** menu.

Note: Once 4:3 Letterbox has been turned On, the video standard in the **Output Standard** menu (above) the video standard in the table will show for example 625/50 4:3 LB (LB = Letterbox)

With the letterbox mode setup, now go to the **User Config - Skirt Setup** menu where the letterbox skirts can be setup.

Once 4:3 letterbox has been turned the output will look like the diagram below.

Side Skirts in Letterbox mode

The diagram shows a 16:9 source displayed on a 4:3 output. The fill for the top and bottom skirts, as mentioned earlier, is setup in the **User Config - Skirt Setup** menu, in the default state only a Matte fill can be selected.

Go back to the **Eng Config - Output Setup - Output Skirts** menu, the user now has several modes that can be selected.

Using the 4:3 Letterbox Mode parameter, letterbox can be set to:-

- **Always** - all sources will be placed into a 16:9 letterbox; when 4:3 sources are selected, they will get both top/bottom skirts and side skirts.
- **When any 16:9** - if the source is 4:3 or the M/E output feeding the switcher output has any 16:9 content on its background, it will be placed into a 16:9 letterbox.
- **When all 16:9** - if the source is 16:9 or the M/E output feeding the switcher output has any 16:9 content on its background, it will be placed into a 16:9 letterbox.
- **Persist** - switches to show a letterbox 16:9 or full frame 4:3 and only changes once its source is completely the opposite format to the one it is currently showing.
- **Auto Zoom** - Will show 16:9 as a letterbox, 4:3 as full frame, and an M/E output will be resized according to the proportions of 4:3 and 16:9 sources that make up its background.

As mentioned earlier, the fill for output skirts is by default a Matte, but physical outputs can also be paired together using the **{Paired}** button (shown above), which will allow the output skirts top and bottom to be filled with any source Video, Still, Wash, DVE output or M/E output.

Output skirts Matte or fill sources can be set independently for each output. Both of the paired outputs will have the same source on them but the audio for the second output will come from the side skirt audio.

If a 4:3 input source is selected on an output that is set to a 4:3 standard, the output will have letterbox skirts and side skirts as shown below.

4:3 source on a 4:3 output
Matte side skirts with Store
letterbox skirts

When a 4:3 source is on a 4:3 output use the M/E Background Skirts parameters to alter the side skirts, and Output Skirts parameters to alter the letterbox skirts.

Media Biometrics

Kahuna generates media biometrics signatures containing vital video and audio information and then outputs the info via the Output BNCs to external equipment such as a Grass Valley Modular Infrastructure card.

Grass Valley Media Biometrics takes the 'fingerprinting' concept a step further by using advanced techniques to both identify media and discover content errors regardless of the content and, in most cases, the processing that has been applied to the content.

> Note: To use the **Media Biometrics** function, the **"Output Cards"** in the mainframe must have **GMC** sub cards. To find out if the output cards have GMC sub cards, open the **Eng Config - Status Monitor** menu, then in the menu touch one of the **"Out Card"** buttons. The GMCs will be listed in the **"Sub-Cards"** information at the bottom of the menu, touch one of the lit numbered buttons and the GMC sub card will be listed in the **"Type"** row if fitted.

To enable Media Biometrics, touch the **{Overall Enable}** button, notice that for the selected row in the table that a **Generator Name** has been applied such as **"BNC-A01"**, and for that row the user can now enable (turn On) the Video/Audio Signature. This will need to be repeated for each output that requires Media Biometrics.

A unique Generator Name can be applied to each output by touching the red name attacher twice and using the on-screen keyboard to type a new name.
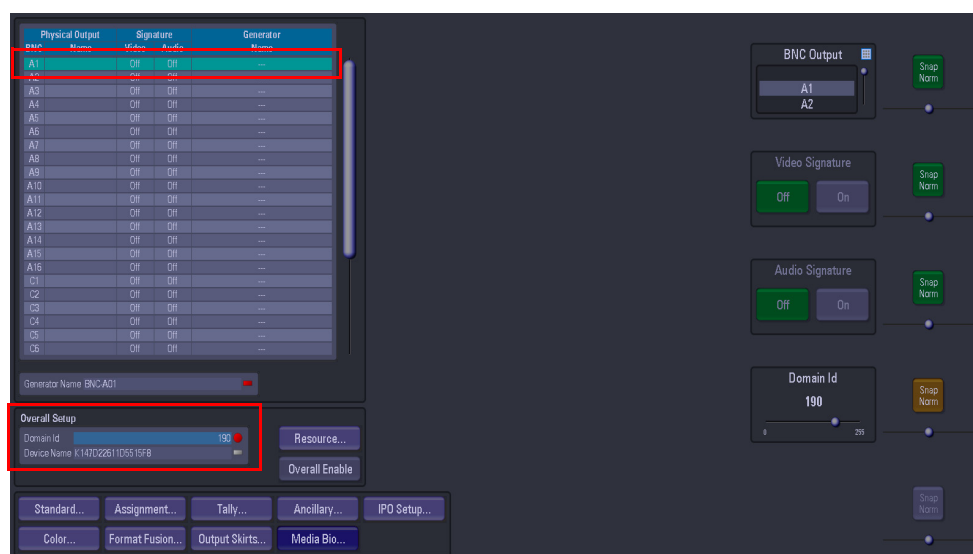
Overall Setup

Domain Id - this is the DDS domain Id that all devices on media biometrics talk via i.e. if certain devices need to talk to each other they need to match this number. This can only be set with **Overall Enable Off.**

Device Name - is used to advertise the Kahuna Media Biometrics Generators to the receivers. In Kahuna this name is append by -A, -B, -C or -D as each Kahuna has a device for each output Fin. This forms the device "friendly name" seen in the external equipment.

> Note: There are 16 generators per each of these devices.

Resource limits - this is to configure some limits on the DDS Micro library.
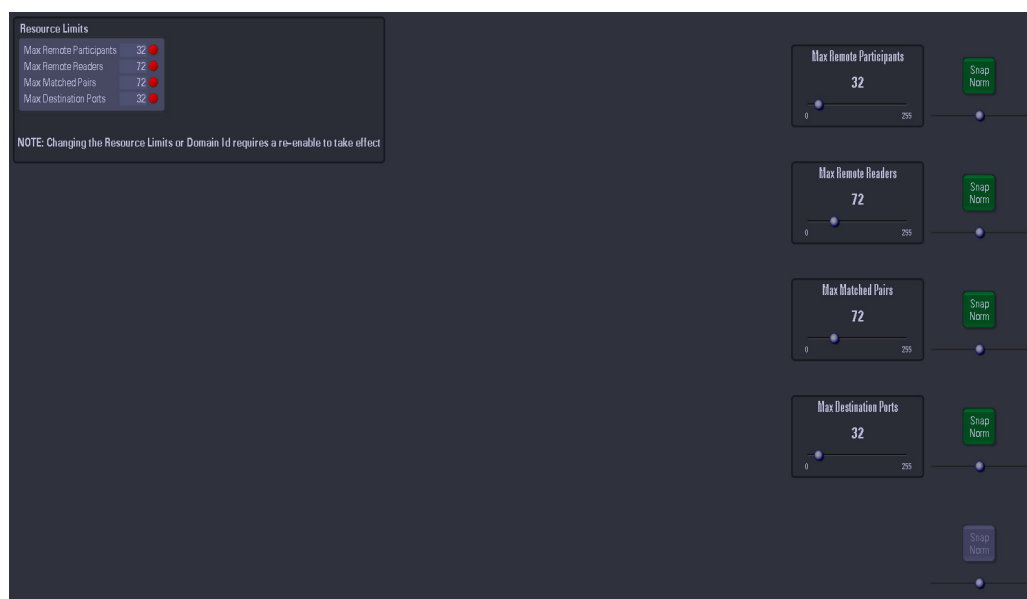
System Standard

From the ENG CONFIG main menu, press the **{System Standard…}** menu link button to enter the "**Engineering Config - System Standard**" menu, here the output standard for the mainframe is set.
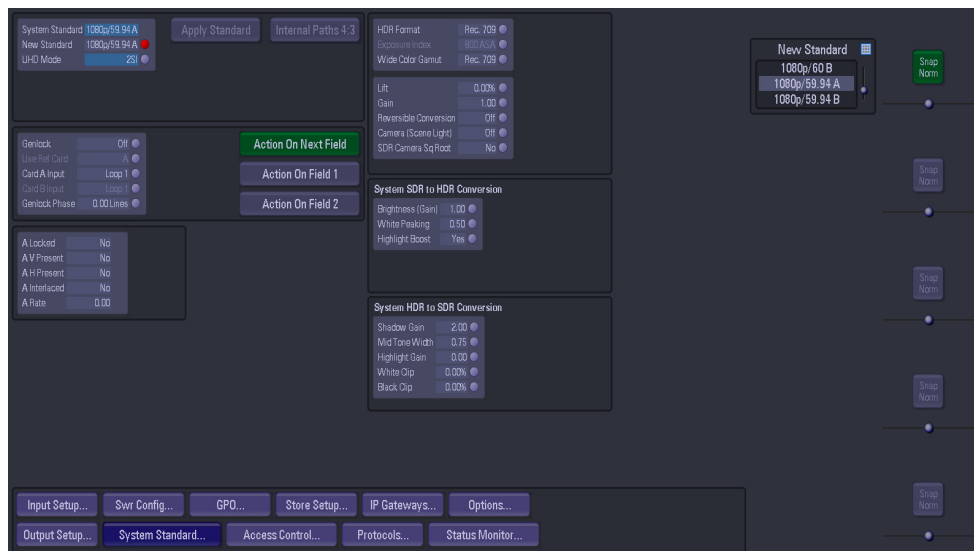
The default mainframe video standard is set using the New Default Standard parameter, selecting which standard is required and then pressing the **{Apply Standard}** button. What ever video standard is selected, it will affect the video standards that the user is able to select in the Input/Output video standards menus. For example if the user selects 1080i/59.94 as shown above, the input and output video standards can only be set to a standard that has 59.94.

> Note: Any source that matches the System Standard and is correctly timed will cut at the correct defined position to avoid any damage to ancillary data.

In 1080p 59.94 A or B standard, touching the "System Standard attached will display the "UHD Mode" selection parameter.
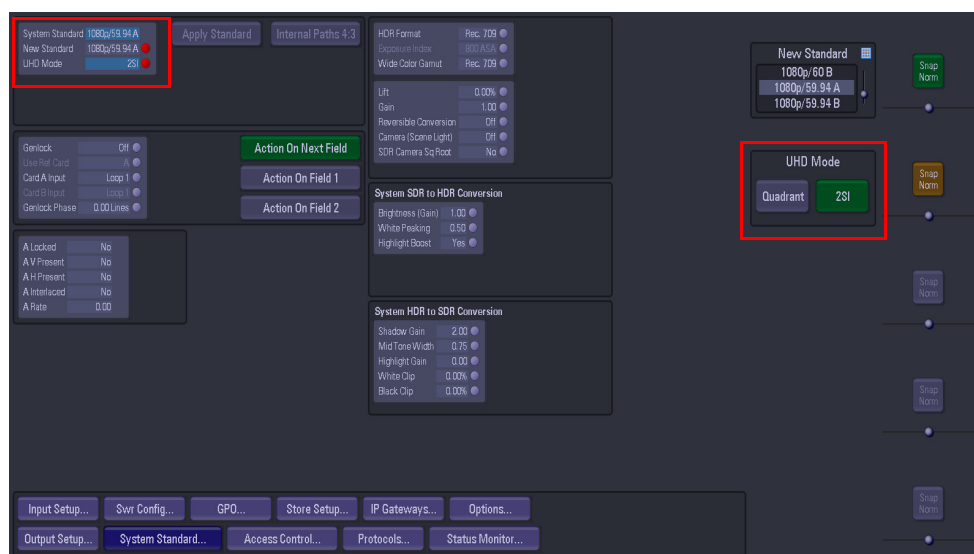
Here the user can select UHD Quadrant or 2SI when setting the system up to work in UHD.

Switch **Genlock** On. Note if the standard set for the selected Reference Input is not compatible with the output standard, (generally 'compatible' means the frame rates are the same or differ by a factor or two) Kahuna will automatically switch to the other Reference Input. If neither is compatible, it will switch Genlock to Off.
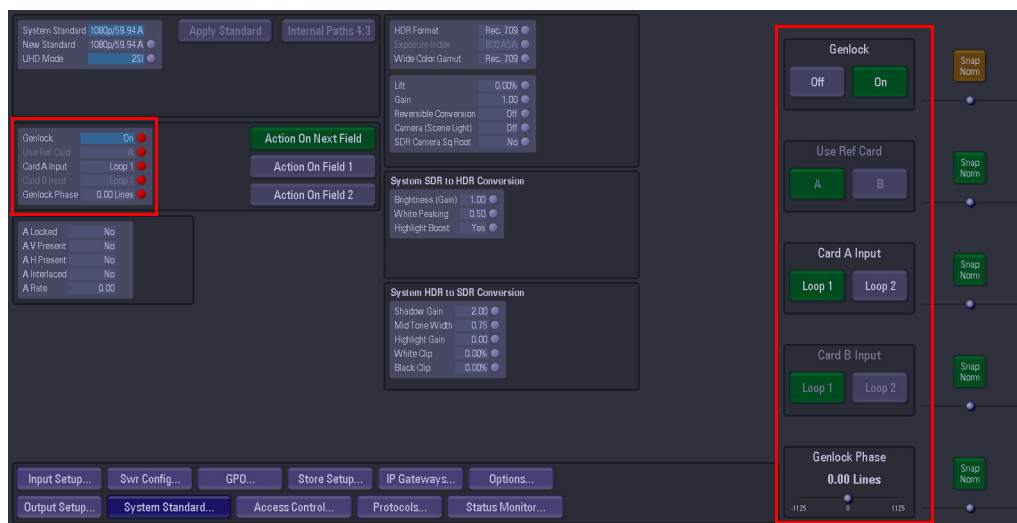
User Ref Card allows the user to select between Reference Fins at the rear of the mainframe. If two control cards and two reference fins are fitted to the mainframe the user can select between the two using the User Ref Card buttons.
If only one card is fitted then only User Ref Card A is selectable.

Card A Input and Card B Input allows the user to select between the two analog reference inputs (Loop1 and Loop2) that are on each Reference Fin.

Genlock Phase sets the timing of the input router cut point relative to the genlock reference.

There are separate status attachers for each REF Fin, A and B. They refer to the analogue reference input (loop1 or loop2) which is currently selected for that REF Fin.

- A or B - **Locked** - Yes = genlocked
- A or B - **V Present** - Yes = vertical sync detected
- A or B - **H Present** - Yes = horizontal sync detected
- A or B - **Interlaced/Progressive** - Yes = interlaced
- A or B - **Rate** = frame rate in Hz

The Ref Fin will not genlock if the standard of the reference is incompatible with the system standard. (Compatible means same 1/2 or 2x).

Reference status for V Present and Rate are valid even if genlock is off, or if the standard of the reference is incompatible with the system standard. Rate isn't valid if H and V are not present.

Actions On, using the rotary control, select the field that any function will act on.

Action On Next Field: all actions on next TV field.

Action On Field 1: sources cut on field 1 only, all other actions on next field.

Action On Field 2: sources cut on field 2 only, all other actions on next field

Swr Config (Switcher Config)

The Switcher Config menu is an extension of the logged off - Mainframe Config menu. The user can access the Predefined Config menu, which allows the user to select logical switcher configurations, allocate Multiviewers across logical switchers.
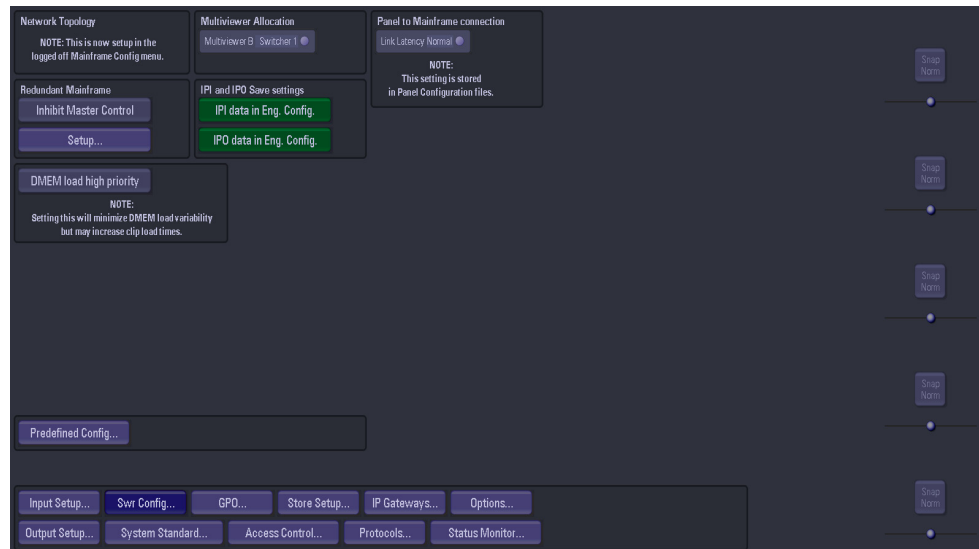
Multiviewer Allocation

The Multiviewer Allocation parameter, allows the user to assign available multiviewers to logical switchers. Touch the "Multiviewer Allocation" attacher and the parameter controls are displayed on the right of the menu.
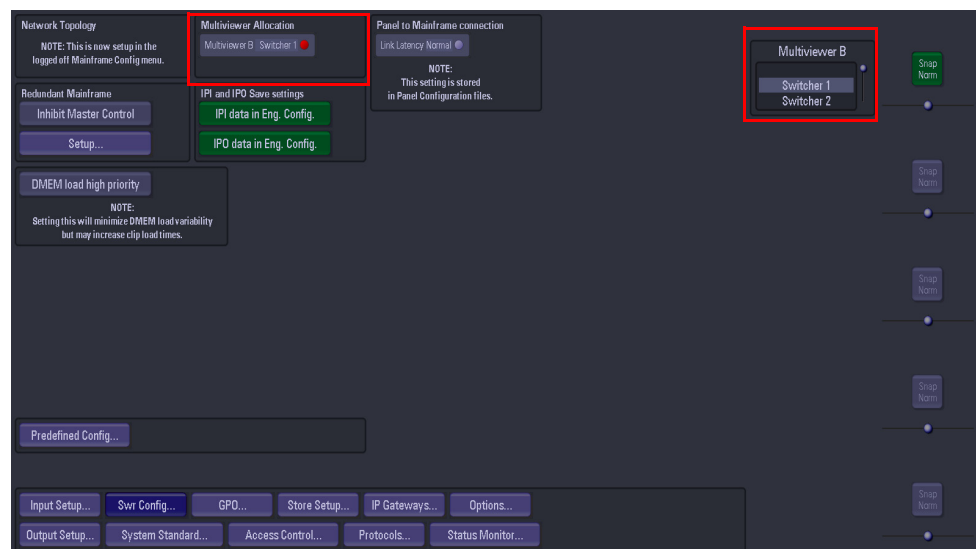
Use the parameter controls to select the required logical switcher.

Panel to Mainframe Connection.

This feature is for High Latency (remote) productions. It simulates the real time updates of the Panel and Mainframe, using a "flywheel genlock". Thus It allows certain parameters to be updated and connected. For example, the TBAR to remain connected.
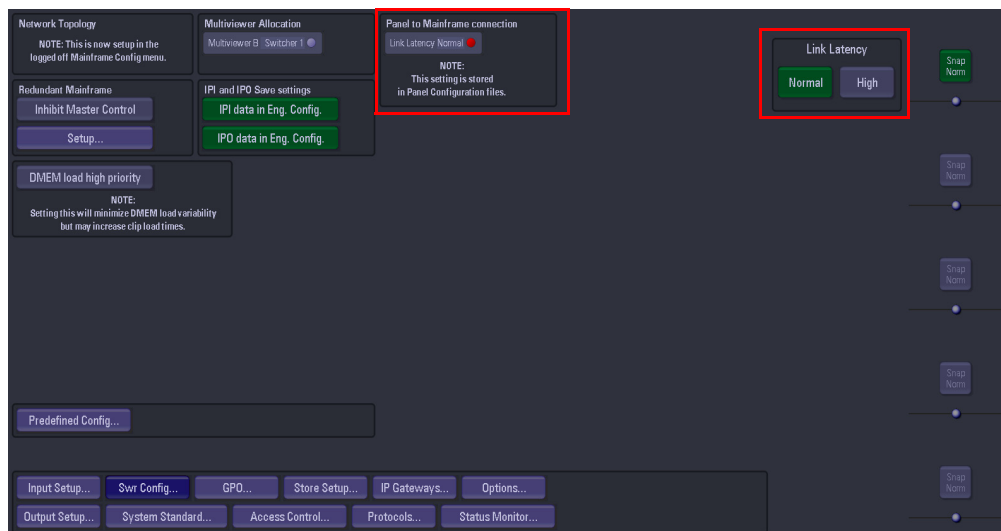
Predefined Config

This is setup in the logged off "Mainframe Configuration" menu. The resources allocated to the predefined configuration options were done in the Switcher Config menus; before logging into the switcher. In this menu the Engineer user has the ability to select and log into any of the predefines switchers by touching the logical switcher buttons and then setup that configuration as required.
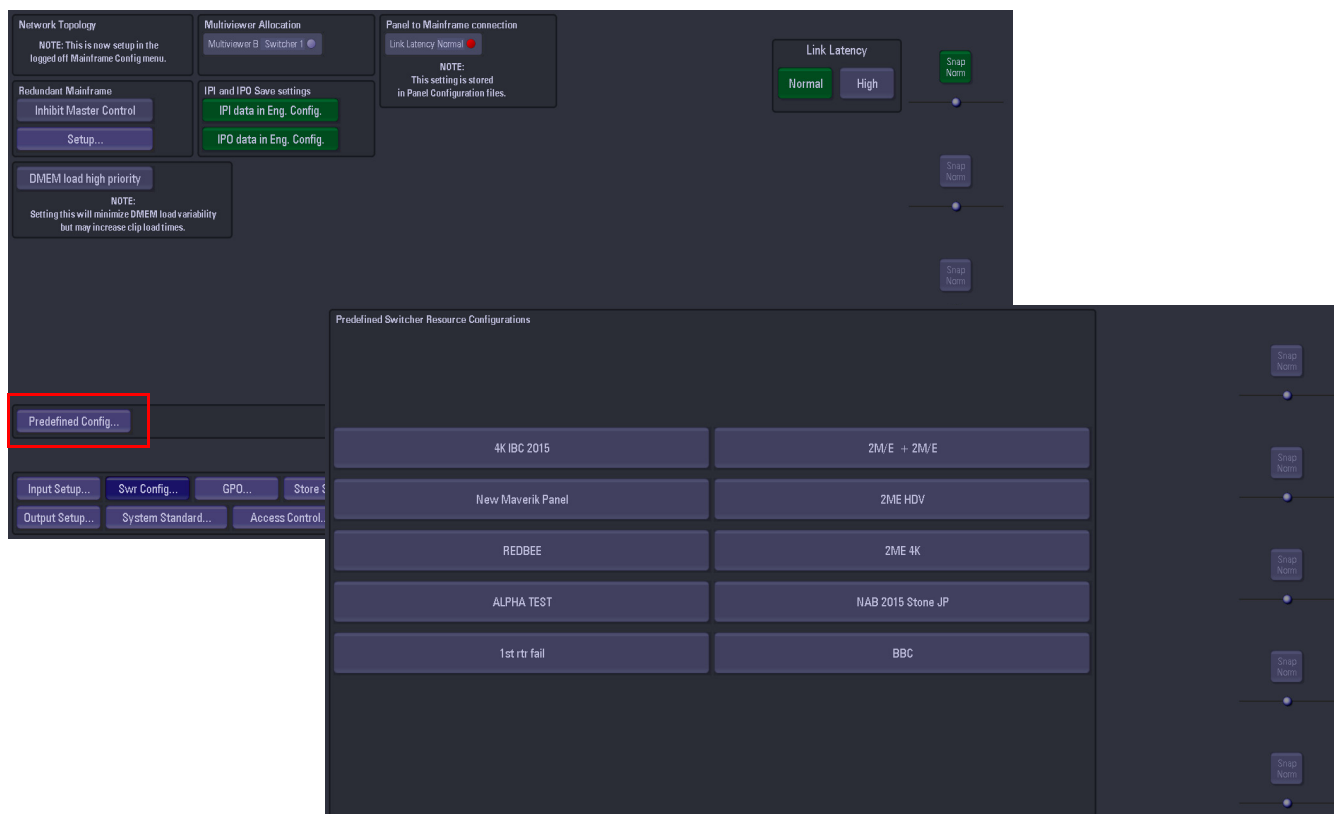
DMEM Load High Priority

This improves the DMEM loading during a large Clip Load. The DMEM is allowed to load i.e. the Store load is broken up and the DMEM load can take priority. When a mainframe is setup in multi Logical Switcher mode, and one of the logical switchers is loading a clip, and the other needs to load a DMEM.
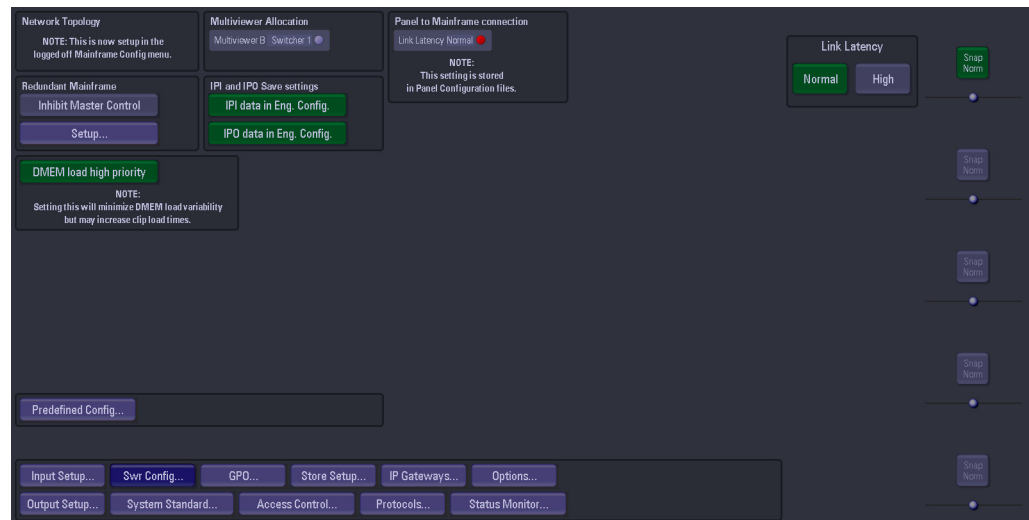
IPI and IPO Data in Eng Config

When selected (green) will save IPI and IPO setup into the current engineering config file.

Redundant Mainframe

Redundant Mainframe or Shadow Switcher gives a complete redundant video path (or number of Video paths) from two independently connected Kahuna mainframes. The shadow switcher mainframe will copy and execute all commands with it the exact time boundary as the respective "Master" switcher mainframe.

> Note: The Master Switcher mainframe and the Shadow Switcher mainframes <u>must</u> be running the same version of software and have all the same resources i.e. number of M/E cards, DVE cards etc.
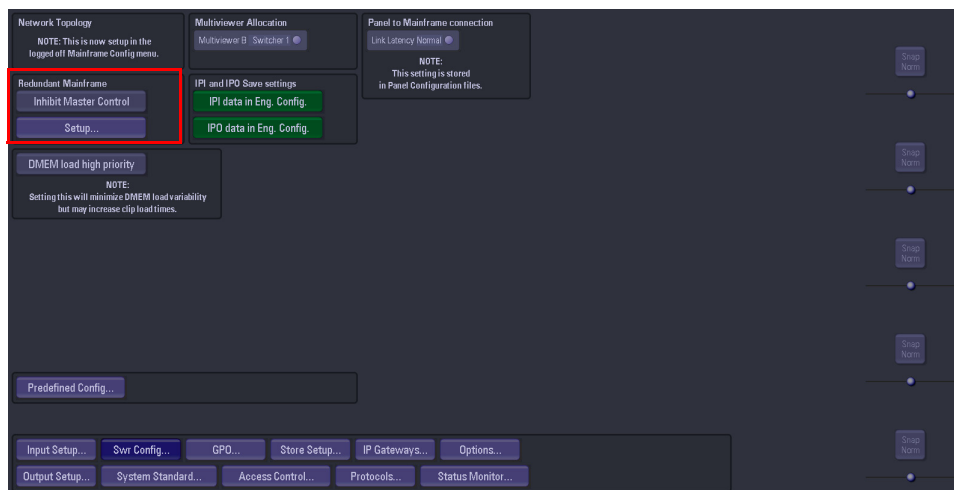
Example of Redundant Mainframe (Shadow Switcher) Setup
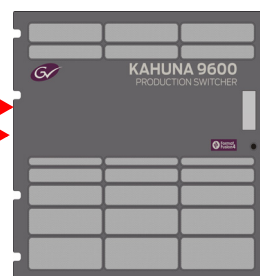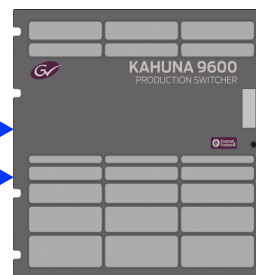
The diagram above is an example that shows a Maverik Control Panel in the main gallery connected to a (customer provided) Ethernet Switch. This could be two separate Ethernet switches for redundancy. From this Switch there are two connections to the Master Kahuna Mainframe. These connections go to both Net Fins on the rear of the Kahuna Mainframe to give

Net Fin Redundancy. It is not necessary to have this second link to allow Shadow Switcher to function.

The switch also has two connections to the Shadow Switcher mainframe, again to both Net Fins. The Master switcher mainframe communicates to the Shadow Switcher via a connection through the Ethernet switch.

This mechanism works from a single Master Mainframe to a single Slave Mainframe. However if there are logical switchers declared within the same Mainframes, the Shadow Switcher concept will link together the declared Logical Switchers. In the diagram, a second Maverik control panel the "Redundant Control Panel" (any Configuration) can be locally installed by the Main gallery control panel and can login into the Master switcher mainframe in case of Failure with the control Panel.

> Note: Before the **Redundant Mainframe** option can be used, in the "Logged Out" state, use the **{Mainframe Finder...}** or the **Panel Config - IP Mainframes** menus to locate the mainframe that will be used for Shadow Switching.

On the "Master" mainframe, in the "Redundant Mainframe" attacher, touch the **{Setup...}** button. The "Redundant M/F" menu will display all mainframes that the master mainframe is able to see over a network.
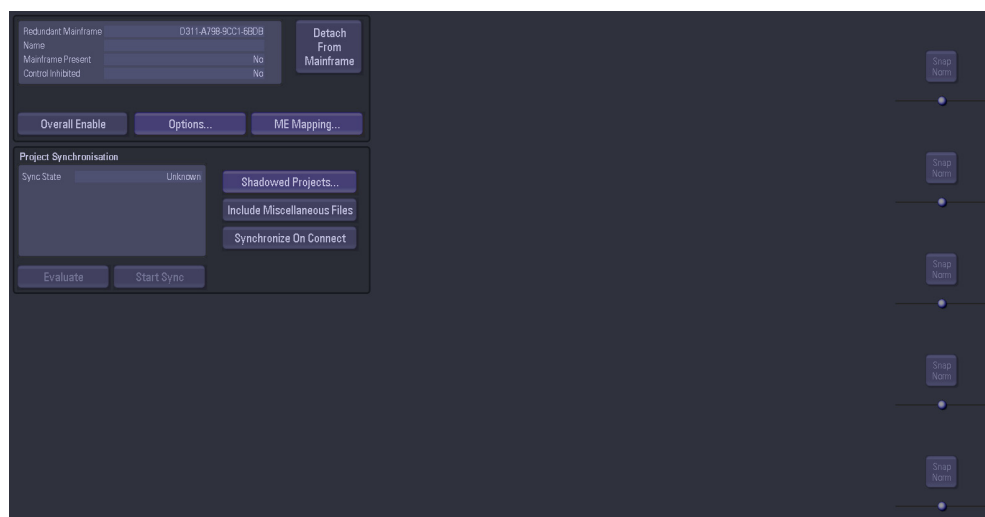
From here the user will setup the shadow switching functions as required.

> Note: **CAUTION! Before taking the next step, make sure that the selected shadow switcher mainframe is the correct one that is going to be used for shadow switching!**
> The first thing that must be done is to synchronize the Master and Shadow switcher mainframe hard disk drives. Once completed, the shadow switcher mainframe hard disk drives will be over written with information from the master mainframe.

Touch the **{Evaluate}** button, the hard disk drives will be compared to see the number of files that need to be copied or deleted, a dialog box will appear displaying the evaluation status. Once the evaluation is completed, touch the **{Start Sync}** button.
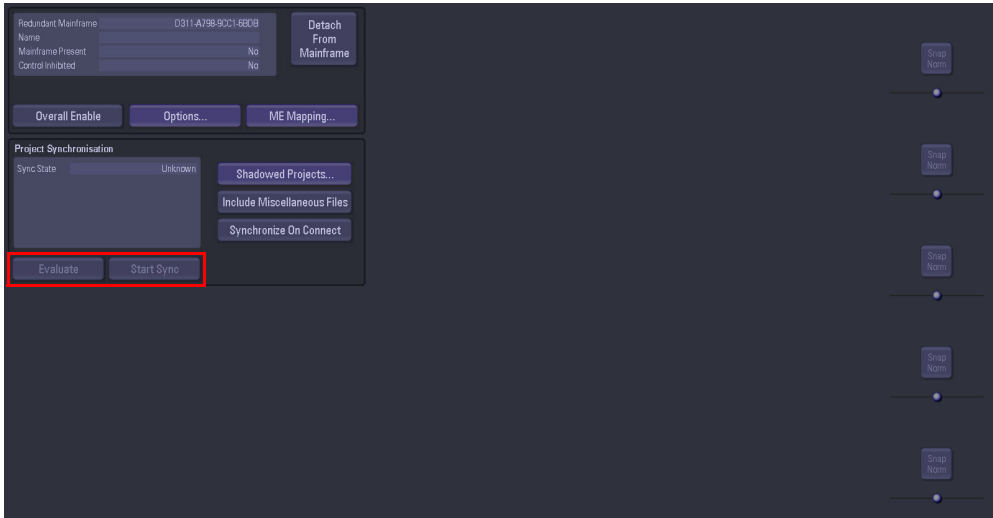
A dialog box will display the synchronization progress, then once completed a dialog box will display "**Completed**" in the "Result" window. The hard disk drives are now synchronized and the shadow switcher mainframe is ready to mirror the master switcher.

Redundant Mainframe Parameter Controls
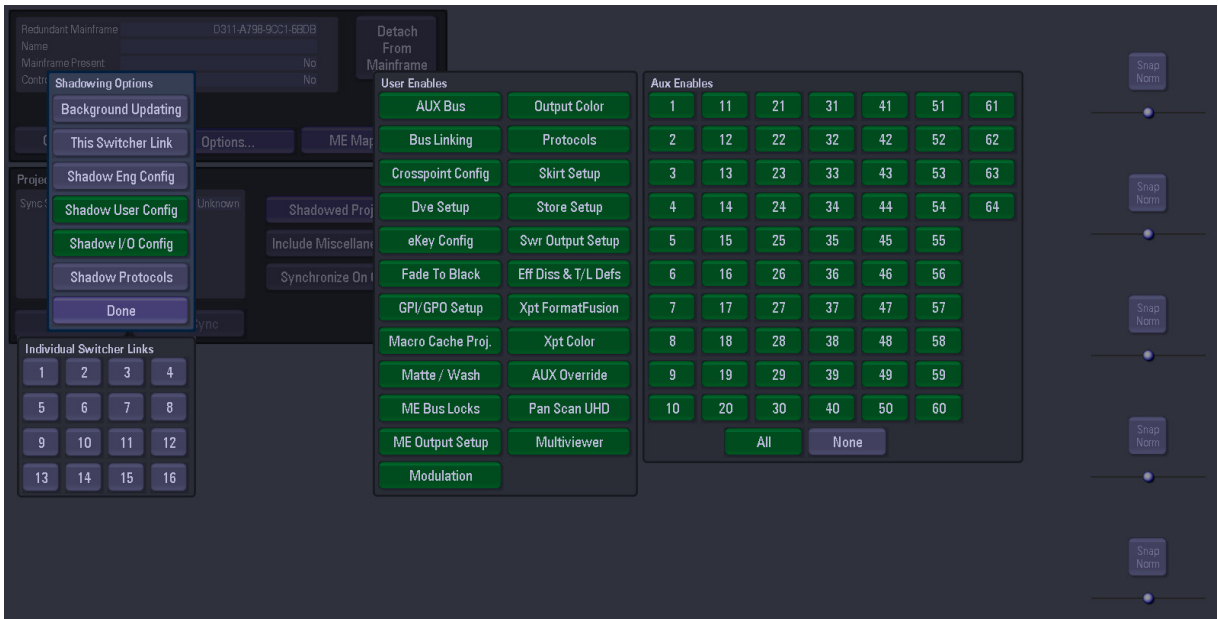
Overall Enable - This enables all commands to be sent to the shadow switcher. The Shadow switcher will now copy and perform bus and crosspoint selection, Transitions, DVEs, Store Load etc with it the exact time boundary as the Master Kahuna (when using the same reference). Any Effects Files (DMEMs/GMEMs/DVEMEMs) Macros etc will also be loaded on command and executed.

Background Updating - The system will constantly check the status of the shadow switcher to ensure it is in the same state as the Master switcher and update it to ensure it is the same.

This Switcher Link - single link to the attached mainframe

The user can now select the Configs that they wish to shadow. Selecting a config also allows to select/deselect individual enables.

Shadow Eng Config - Enables Eng Config loaded on the master to be shadowed

Shadow User Config - Enables User Config loaded on the master to be shadowed

Shadow I/O Config - Enables I/O Config loaded on the master to be shadowed

Shadow Protocols - Enables if protocols on the master switcher are shadowed by the shadow switcher.

Shadowed Projects - Select which projects will be shadowed by the shadow switcher.
{All} will select all projects
{Existing} will select all existing projects on the master mainframe
The user can also touch the **{None}** button to clear all selections and select individual projects as required.
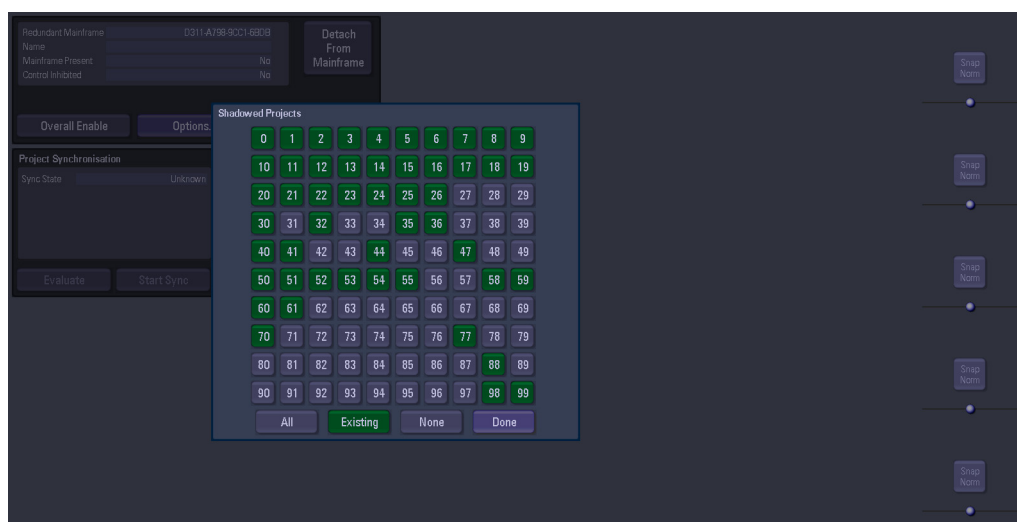
Include Miscellaneous Files - Enables all misc files to be shadowed by the shadow switcher

ME Mapping - will map the M/Es exactly how they are setup from master to slave
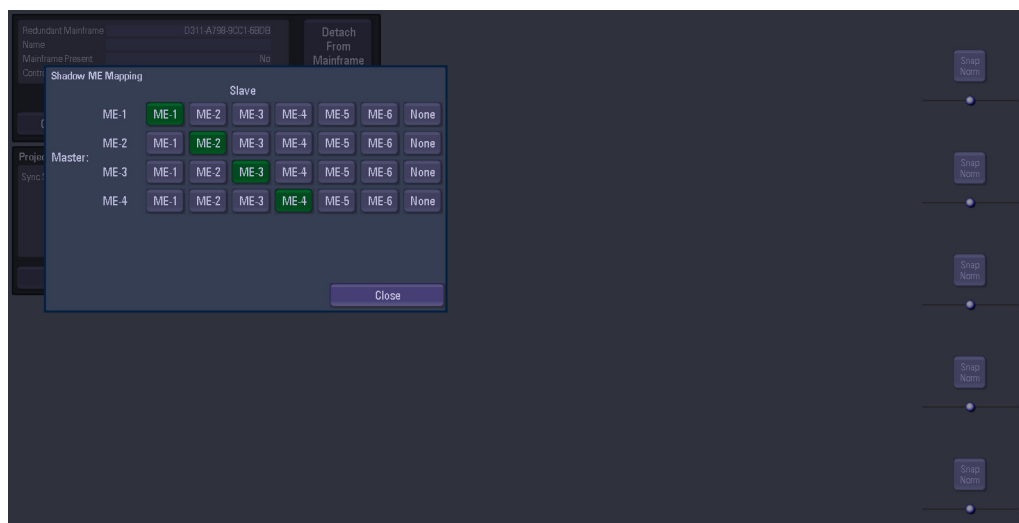
Detach From mainframe - removes the link between the Master and Shadow mainframe. This can also be done using the **{Inhibit Master Control}** in the "Star" menu. Press the "Star" button on the MAV-GUI to display the menu.

GPO and GPI Setup

GPOs and GPIs are used to trigger a function This menu allows the user set up any of the GPO 1 to 256 of which:

- Tally GPO 1 to GPO 120 correspond to the physical Input Fin GPO's at the rear of the mainframe.
- GPO 121 to GPO 132 and GPO 133 to GPO 144 are the physical Ref Fin GPO's, again at the rear of the mainframe. These GPO's are system setup dependant; GPO 121 to GPO 132 Ref Fin A, GPO 133 to GPO 144 Ref Fin B.
- GPO 145 to GPO 256 are Internal (Virtual) GPO's (but the configuration could be GPO 133 to GPO 256 if only 1 Ref Fin is fitted).

This is a "source" based GPO setup menu, meaning that it is used to tally on sources coming into the Kahuna mainframe.

The physical relay tallys are in groups of 12 and are a one-to-one connection to the BNC inputs on the input Fins, so Input Fin A (Fin In A) - BNC 1 to 12 will have a direct connection with Tally A1 to Tally A12. This will be the same for all input Fins fitted to the mainframe up to Fin In J. The GPO connections are not physically tied to the inputs so can be assigned to any other input as required.
The internal tallys are used to trigger internal functions; for example Macro's.
The menu table shows the GPO number 1 through to 256; these are selected by the GPO Select parameter on the right. How the GPO's are driven is determined by the GPO Enables set.
The user can also select and setup up any of the 256 GPIs, 144 GPIs are real (depending on the system configuration purchased) and GPIs 145 to 256 are internal.
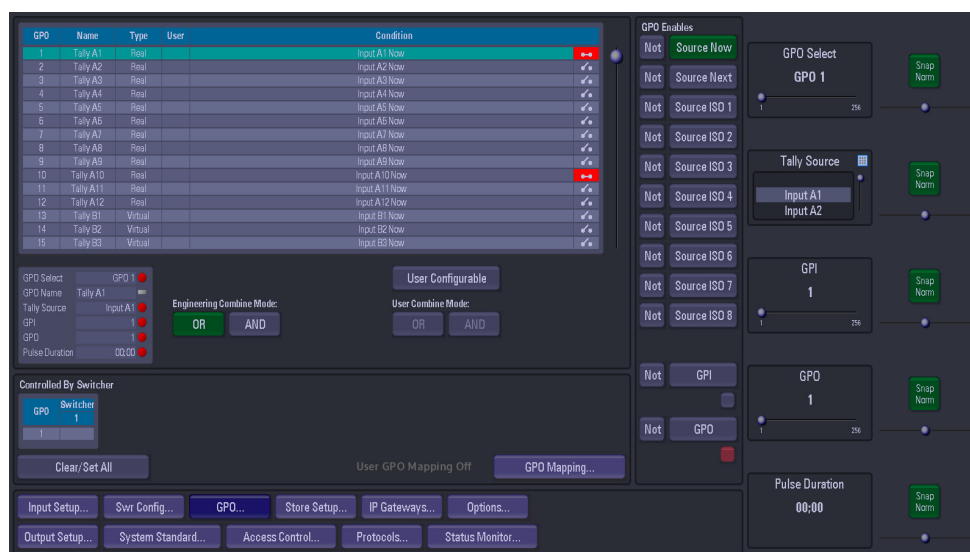
The functions in the attacher below the GPO table is adjusted using the parameter controls on the right.
GPO Select is used to scroll down the table through the individual GPO/Tally's, the **Name** parameter allows the user to re-name the tally if required. The default table is a one-to-one connection; Tally to Input, use the **Source** parameter to assign a tally to another input as required.

The **User Configurable** Yes/No parameter will allow the tally to be used in the **User Config - GPO Setup** menu.

> Note: If the user does not have the correct access permissions to work in the Engineering Config menu, the physical input Tally relays are not visible to the switcher operator in the User Config - GPO Setup menu, but can be assigned to be visible in this menu by a user with engineering access permission using the User Configurable parameter.

GPO Enables

Source Now - This sets the GPO to be a tally for On Air Sources.

Source Next - This sets the GPO to be a Tally for the next on air source. Source next is determined by which sources are just one transition away, including any M/E re-entry. E.g. If M/E2 is set to look at M/E1 the next configuration will indicate the next sources, including Keys, in the M/E2 transitions, as well as the next sources in the M/E1 transition.

Combine OR and Combine AND - Performs a logical 'ANDing' or ORing' of the GPO Enables. This defines the combined event, which will trigger a GPO and GPI.

Source ISO/ISO8 - This sets the GPO to be an ISO (Isolated) tally for On Air Sources.

Red Indicator - If GPO 1 is set to look at a Source and its State is Closed the light for GPO 1 will be Red.

> Note: The GPO Enables have to be set for each GPO for the parameter to be actually used.

GPO - This is used to add a GPO as the function in the selected "Condition" in the table.

GPI - This is used to add a GPI as the function in the selected "Condition" in the table.

GPO Pulse Duration
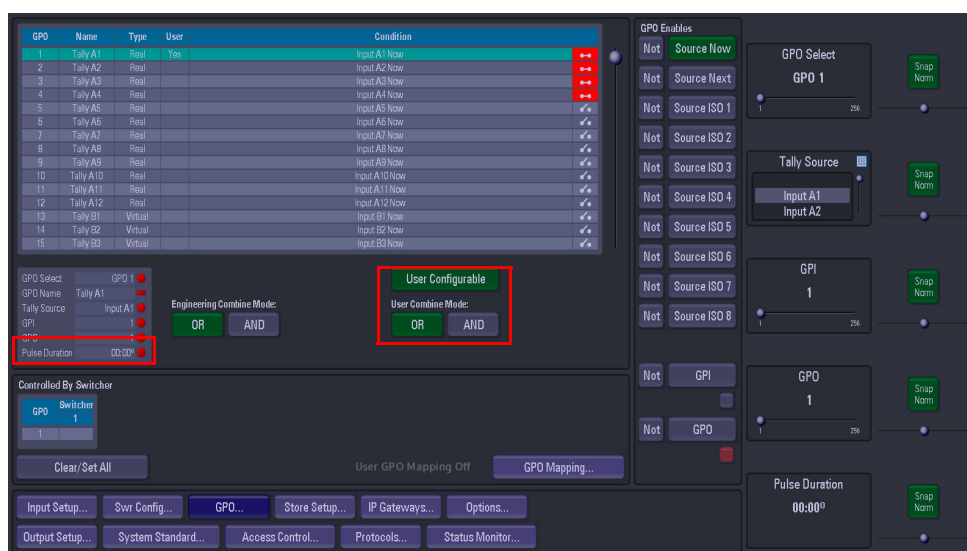
This will trigger a selected GPO to be pulsed On constantly when set to 00;00, or to be pulsed On/Off from instantaneously (1 field) up to a set pulse duration time that is adjusted using the **Pulse Duration** parameter. The pulse will briefly invert the state of the GPO even if it is currently timing out a pulse generated by the **Pulse Duration** function. Make sure that the **User Configurable** button is on (green).

As you set each GPO to be "**User Configurable**", the "**Controlled By Switcher**" parameter needs to be set. Touch the **{Clear/Set All}** button. This will set the selected GPO to work with all available logical switchers.

Touching the **{GPO Mapping}** button will display GPO mapping to all of the logical switchers. This menu allows the user to enable/disable virtual and real GPOs across the logical switchers.
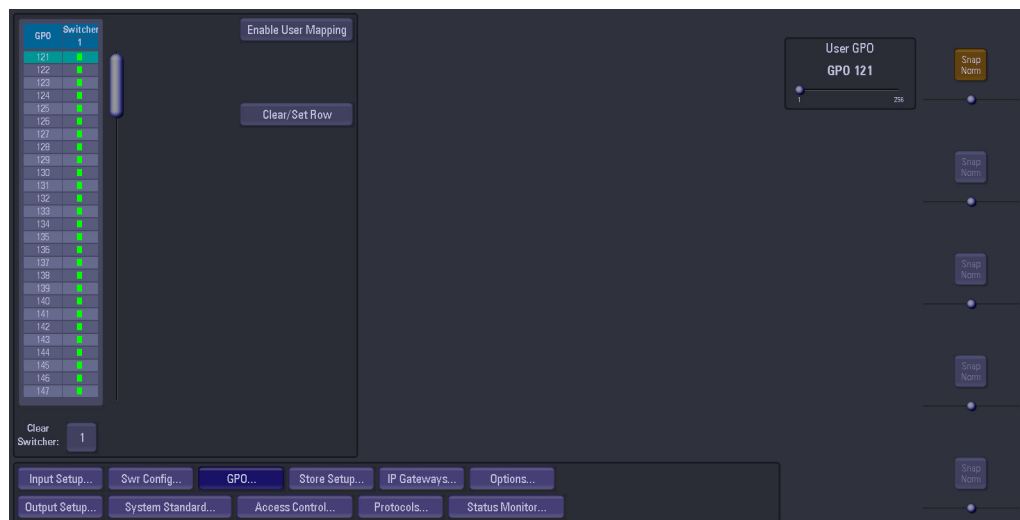
If there are no "**User Configurable**" GPOs set, the list of GPOs that can be enabled/disabled are all virtual GPOs 121 to 256. When the user sets GPOs as "User Configurable" the "Real" GPOs 1 up to 121 are then displayed in the table as they are set.

Access Control

Access Control allows engineering staff or advanced users to setup user accounts with the ability to allow full access to all of Kahuna's functionality or restrict access as necessary. Care is needed when setting up user accounts to make sure the right access is given.

Manage Users

> Note: Access to this menu is restricted to users with full access rights. Access to the menu is grayed out to all other users.
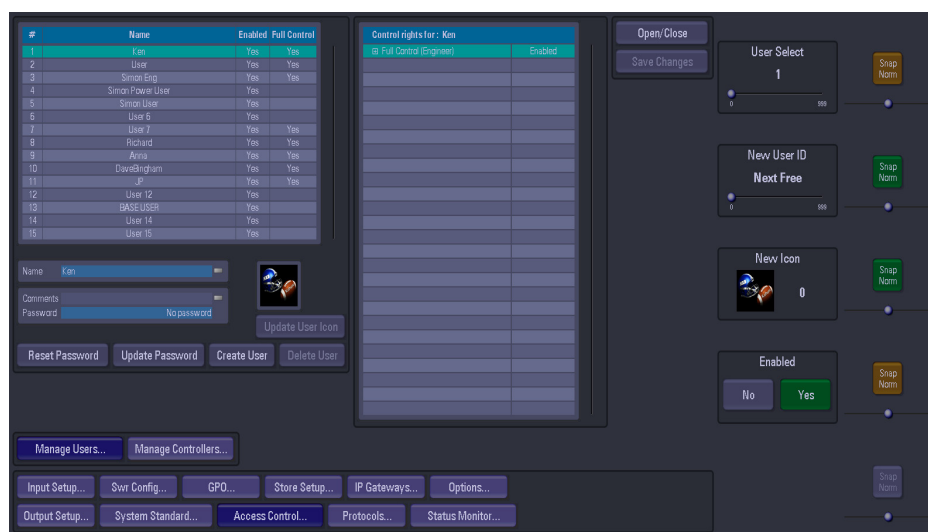
To create a user, make sure that the "New User ID" is set to its default state (Snap Norm green), Then touch the **{Create User}** button. A new user has now been added to the table in the next available slot.

A name can be given to the user account by touching the Name attacher and then touching the Red indicator twice to enable the on-screen keyboard.
The user account can be given a **Password**, touch the **{Update Password}** button and then you will be prompted to enter a password into the number pad twice. Finally, touch the **{Update}** button to save the password. The password can be reset by pressing the **{Reset Password}** button.
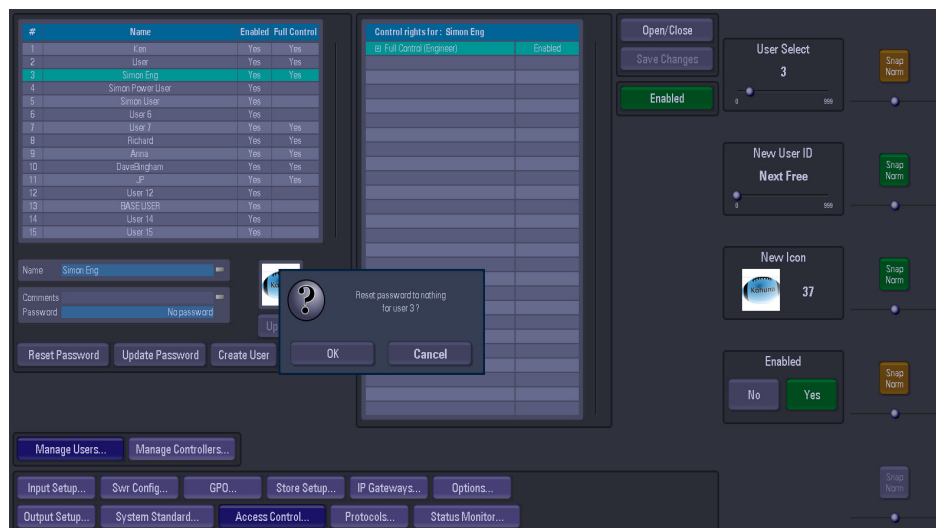
The user account can be given an icon for easy identification and personalization. The icons are used in the Configuration menu's, and in the Login menu.
To set an Icon, use the "**New Icon**" parameter to scroll through the available icons. The **{Update User Icon}** button will turn brown, touch the button to set the icon to the user account.
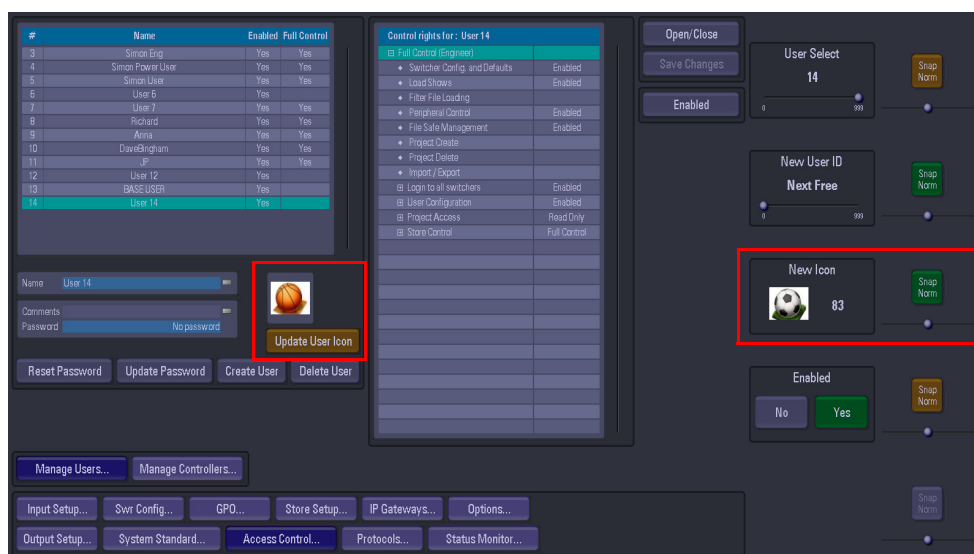
In the attacher below the "Name" attacher, "Comments" regarding the type of user account can be added for future reference.
The attacher will also show if the account has a password.
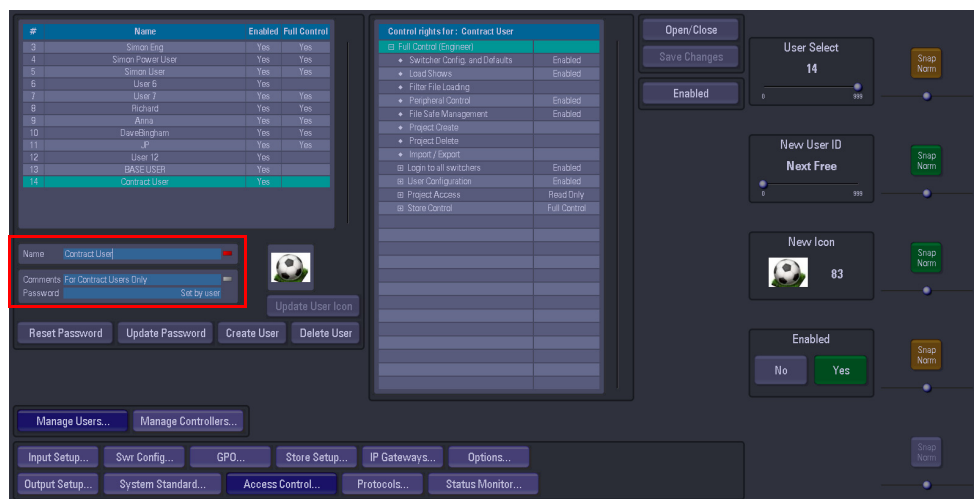
Control Rights

This part of the menu is used to setup the access rights for the users.
Select a user in the table, then look at the "**Control rights for:**" table. If the first row "Full Control (Engineer) has "Enabled" in the second column then the user has full access rights.
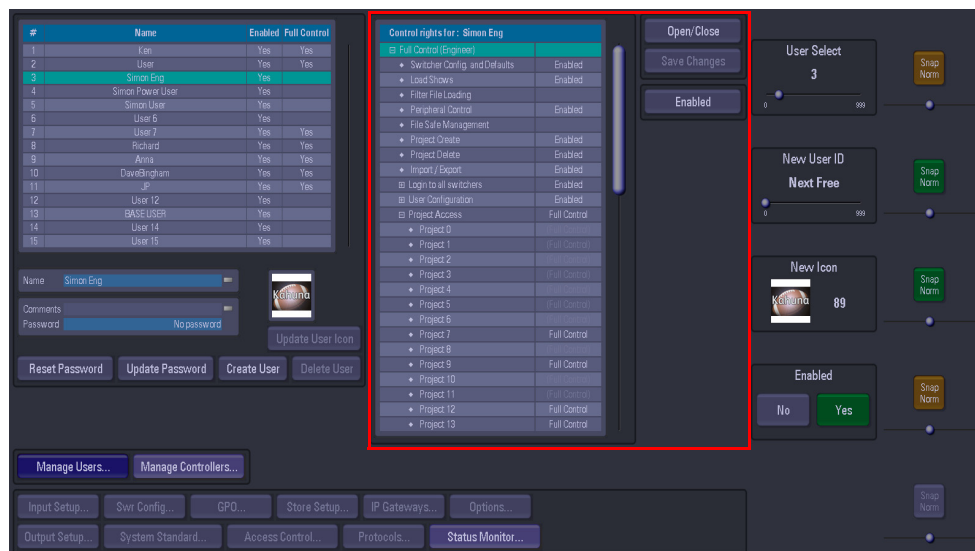
Touching the **{Open/Close}** button will expand the access options in the "**Control rights for:**" table. You can now use the {Enable} button to Enable/Disable control rights in the table.

The last two access options; "Project Access" and "Store Control" have extra options. Access rights are listed as follows:

- No Control
- Read Only
- Full Control

Once the access rights have been set for the new account, touch the **{Save Changes}** button. Once enabled, when the user logs into the system with there account, if they do not have full access rights then some of the menus will be grayed out.
If the user has "**Full Control**" rights, they will also be able to access the **Mainframe Config** menus before logging into the system.

Manage Controllers

The **Access Control** menu also allows a user account to associated to a specific GUI panel connected to the Kahuna mainframe.

If the Kahuna mainframe has been configured as multiple Logical Switchers, this allows more than one GUI to be connected to the mainframe to control the individual logical switchers, the **Manage Controllers** menu allows user accounts to be assigned to GUI panels.
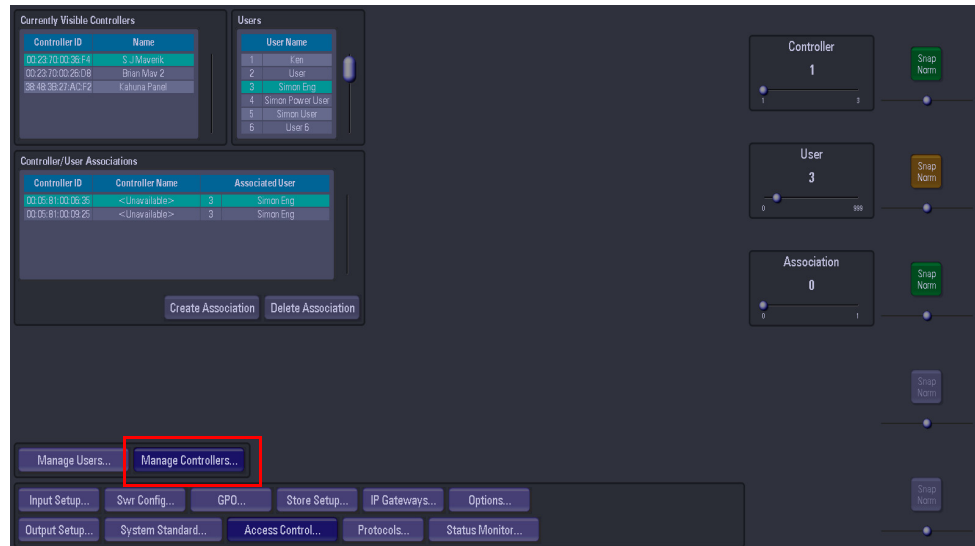
If one or multiple GUI panels are connected to the mainframe, they will be displayed in the **Currently Visible Controllers** table.

To create an association between the user account and the controller, use the **Controller** parameter to select the GUI/s, the user account is selected using the **User** parameter, then user the **Association** parameter to create an association between the user account and the controller, then finally press **{Create Association}**. Notice that a user account and a controller are now entered in the **Controller/User Associations table**.

Store Setup

The Stores Setup menu allows the user to allocate time to a group of stores for video or audio playback.
This menu should be setup after allocating stores to Logical Switchers in the Mainframe Config menus.
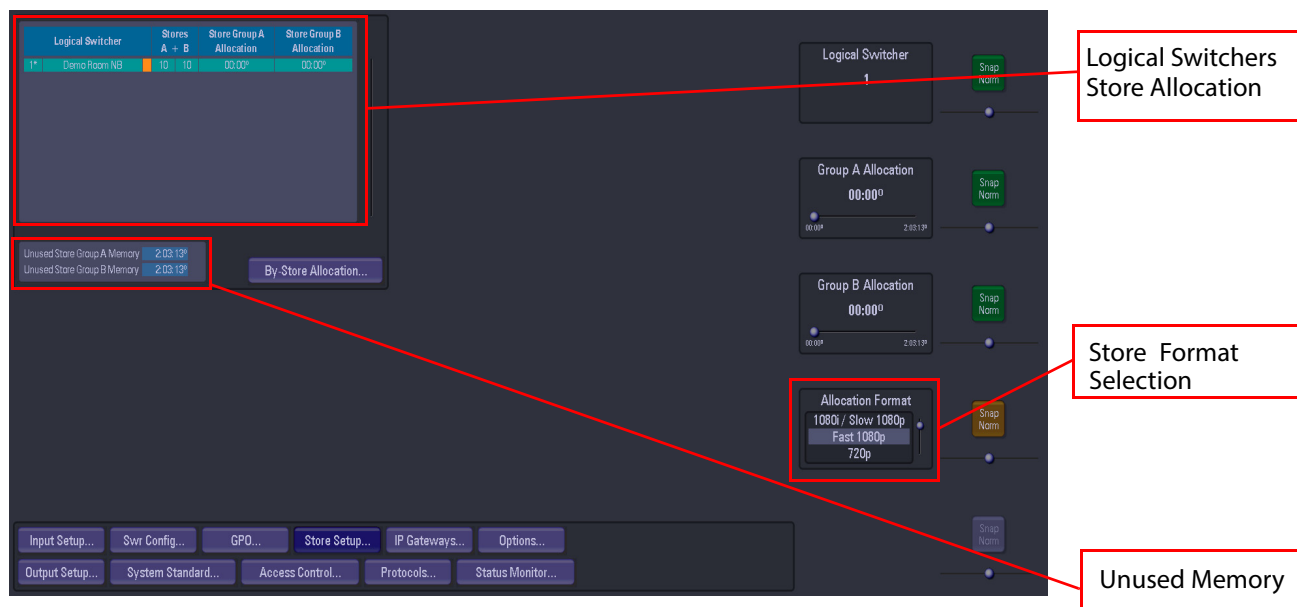
The area in the center of the menu displays the logical switchers and how the stores are allocated across them. The diagram above displays 1 logical switcher with 10 stores allocated. The information area below the logical switcher store allocation list; displays the unused store memory that is available to use. This will change as more memory is allocated to the stores.
The **Group A/B Allocation** parameter is used to allocate memory to the selected stores group. The slider bar in this parameter starts at 00;00 and at the other end of the slider displays the amount of maximum time that can be allocated to stores; which depends on the video or audio standard selected in the **Allocation Format** parameter.
The store **Allocation Format** parameter is used to select the video/audio format for the stores group. While scrolling through the Allocation Format notice that the "Unused Store Group A/B Memory" changes to suit the remaining memory allowance.

Kahuna Store Capacity Tables

The tables below display the Kahuna storage capacity as selected using the Allocation Format parameter. The size of storage is determined by the size of the RAM purchased with the system, the options are:

16Gb, 32Gb, 48Gb, and 64Gb. The outputs listed are the number of available stores.

50

16Gb 10 Outputs

Allocation Format	Group A (16GB)	Group B (0GB)	Total
SD	10:20;20	00:00:00	10:20;20
1080i/Slow 1080p	2:04;04	00:00:00	2:04;04
Fast 1080p	1:02;02	00:00:00	1:02;02
720p	2:20;13	00:00:00	2:20;13
Audio	6:14;10	00:00:00	6:14;10
SD Frames	15520	0	15520
HD 1080 Frames	3104	0	3104
HD 720 Frames	6984	0	6984
Audio Frames	558720	0	558720
Chunks	388	0	388

32Gb 10 Outputs

Allocation Format	Group A (32GB)	Group B (0GB)	Total
SD	20:41;15	00:00:00	20:41;15
1080i/Slow 1080p	4:08;08	00:00:00	4:08;08
Fast 1080p	2:04;04	00:00:00	2:04;04
720p	4:39;09	00:00:00	4:39;09
Audio	12:28:20	00:00:00	12:28:20
SD Frames	31040	0	31040
HD 1080 Frames	6208	0	6208
HD 720 Frames	13968	0	13968
Audio Frames	1117440	0	1117440
Chunks	776	0	776

32Gb 20 Outputs

Allocation Format	Group A (16GB)	Group B (16GB)	Total
SD	10:20;20	10:20;20	20:41;15
1080i/Slow 1080p	2:04;04	2:04;04	4:08;08
Fast 1080p	1:02;02	1:02;02	2:04;04
720p	2:20;13	2:20;13	4:39;09
Audio	6:14;10	6:14;10	12:28:20
SD Frames	15520	15520	31040
HD 1080 Frames	3104	3104	6208
HD 720 Frames	6984	6984	13968
Audio Frames	558720	558720	1117440
Chunks	388	388	776

48Gb 20 Outputs

Allocation Format	Group A (32GB)	Group B (16GB)	Total
SD	20:41;15	10:20;20	31:02;05
1080i/Slow 1080p	4:08;08	2:04;04	6:12;12
Fast 1080p	2:04;04	1:02;02	3:06;06
720p	4:39;09	2:20;13	6:59;24
Audio	12:28:20	6:14;10	18:42;30
SD Frames	31040	15520	46560
HD 1080 Frames	6208	3104	9312
HD 720 Frames	13968	6984	20952
Audio Frames	1117440	558720	1676160
Chunks	776	388	1164

64Gb 20 Outputs

Allocation Format	Group A (32GB)	Group B (32GB)	Total
SD	20:41;15	20:41;15	41:22;30
1080i/Slow 1080p	4:08;08	4:08;08	8:16;16
Fast 1080p	2:04;04	2:04;04	4:08;08
720p	4:39;09	4:39;09	9:18;18
Audio	12:28:20	12:28:20	24:57;10
SD Frames	31040	31040	62080
HD 1080 Frames	6208	6208	12416
HD 720 Frames	13968	13968	27936
Audio Frames	1117440	1117440	2234880
Chunks	776	776	1552

59.94

16Gb 10 Outputs

Allocation Format	Group A (16GB)	Group B (0GB)	Total
SD	10:08;14	00:00:00	10:08;14
1080i/Slow 1080p	1:43;16	00:00:00	1:43;16
Fast 1080p	00:51;38	00:00:00	00:51;38
720p	1:56;30	00:00:00	1:56;30
Audio	6:14;10	00:00:00	6:14;10
SD Frames	18236	0	18236
HD 1080 Frames	3104	0	3104
HD 720 Frames	6984	0	6984
Audio Frames	558720	0	558720
Chunks	388	0	388

32Gb 10 Outputs

Allocation Format	Group A (32GB)	Group B (0GB)	Total
SD	20:16;28	00:00:00	20:16;28
1080i/Slow 1080p	3:27;04	00:00:00	3:27;04
Fast 1080p	1:43;16	00:00:00	1:43;16
720p	3:53;00	00:00:00	3:53;00
Audio	12:28:20	00:00:00	6:14;10
SD Frames	36472	0	36472
HD 1080 Frames	6208	0	6208
HD 720 Frames	13968	0	13968
Audio Frames	1117440	0	1117440
Chunks	776	0	776

32Gb 20 Outputs

Allocation Format	Group A (16GB)	Group B (16GB)	Total
SD	10:08;14	10:08;14	20:16;28
1080i/Slow 1080p	1:43;16	1:43;16	3:27;04
Fast 1080p	00:52;13	00:52;13	1:43;16
720p	1:56;30	1:56;30	3:53;00
Audio	6:14;10	6:14;10	12:28:20
SD Frames	18236	18236	36472
HD 1080 Frames	3104	3104	6208
HD 720 Frames	6984	6984	13968
Audio Frames	558720	558720	1117440
Chunks	388	388	776

48Gb 20 Outputs

Allocation Format	Group A (32GB)	Group B (16GB)	Total
SD	20:16;28	10:08;14	30:24;12
1080i/Slow 1080p	3:27;04	1:43;16	5:10;20
Fast 1080p	1:43;16	00:52;13	2:35;29
720p	3:53;00	1:56;30	5:49;30
Audio	12:28:20	6:14;10	18:42;30
SD Frames	36472	18236	54708
HD 1080 Frames	6208	3104	9312
HD 720 Frames	13968	6984	20952
Audio Frames	1117440	558720	1676160
Chunks	776	388	1164

64Gb 20 Outputs

Allocation Format	Group A (32GB)	Group B (32GB)	Total
SD	20:16;28	20:16;28	40:33;26
1080i/Slow 1080p	3:27;04	3:27;04	6:54;08
Fast 1080p	1:43;16	1:43;16	3:27;02
720p	3:53;00	3:53;00	7:46;00
Audio	12:28:20	12:28:20	24:57;10
SD Frames	36472	36472	72944
HD 1080 Frames	6208	6208	12416
HD 720 Frames	13968	13968	27936
Audio Frames	1117440	1117440	2234880
Chunks	776	776	1552

IP Gateways

The **Engineering Config - IP Gateway** menu allows the user to add a route to a destination network through a local IP Gateway.
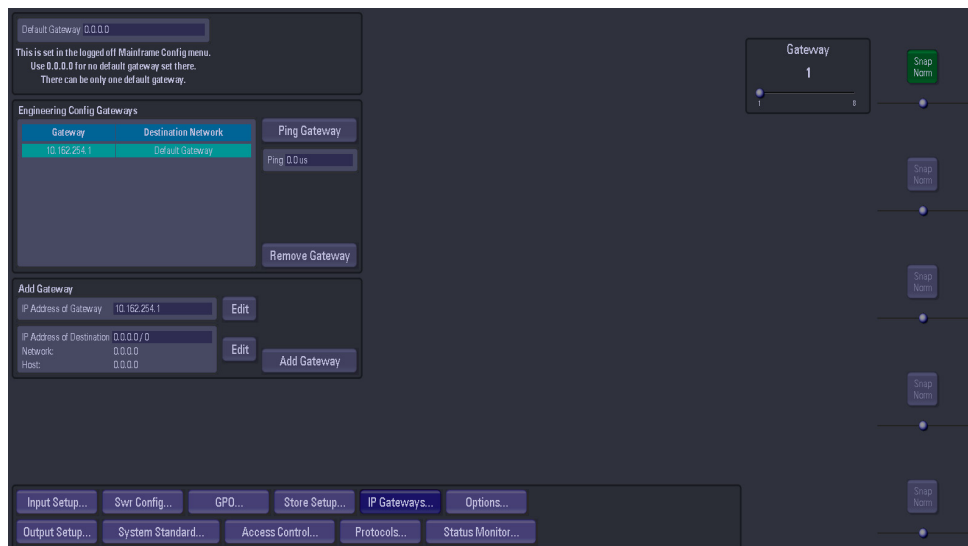
Touch the **IP Address of Gateway** attacher and set the four **New Gateway** parts of the address (A) (e.g. 172.28.1.6). Note. The network part of this address must exactly match the network part of the panel's IP address.

Next press the **IP address of Destination Network** attacher and set the four parts of the destination network address (e.g. 172.23.0.0) and set the number of bits of the netmask for the destination network.

Finally, press **Add Gateway** to add the new gateway to the list at the top of the menu. This has now told the panel how to send a message onto network 2, but not where it should go when it gets there.

To check that the gateway is attached to the network and is responding, press the **{Ping Gateway}** action button. The box below the button should show the ping round-trip time for a few seconds.

Press **{Remove Gateway}** then make the required changes to the five parameters, then press **{Add Gateway}** to put the modified entry back into the list.

Protocols

The **"Engineering Config - Protocols"** menu is used to set parameters for bi-directional communication with external devices either by one of the RJ45 RS422 ports or selecting one of the IP protocol connections.
Protocols have to be setup in this menu before the Peripherals connections and functionality can be used.

There are 7 Protocol Types to choose from; Tally & UMD, Router, Playout, Editor, Camera, Audio, and Miscellaneous. Each protocol type has a number of available sub-protocols to choose from, that allows the user to connect to a large number of different types of external equipment.

The Available Protocols in their Protocol Types are as follows:

Protocol Type						
Tally & UMD	**Router**	**Playout**	**Editor**	**Camera**	**Audio**	**Miscellaneous**
Tally	Pesa CPU Link P1 Router	Sony BVW-75 VTR	GVG 100	Shotoku Robotics	Calrec	User Definable Protocol
Kahuna Tally	Pesa CPU Link USP Router	Kahuna As BVW-75 VTR	Sony BVS/DVS	VISCA	Yamaha	Macro Control
GVG (Philips) MPK Tally	SW-P-08 Router	BVW-75 Timecode Request	Automation	GV LDK Camera	Ember+	IQDSK Keyer Control
TSL UMD (Input Only)	As SW-P-08 Router (Xpt)	AMP IP	Ignite			Loopback Test
TSL UMD (Output Only)	As SW-P-08 Router (Src)	VDCP	RollCall Control			RCS Interaction
TSL UMD IP (Output Only)	SW-P-02 Router	VDCP-Simple				4K Pan and Scan
GVG (Philips) MPK UMD	As SW-P-02 Router	Odetics VDR Control				RollCall Set Param
	NVision NP0010-02 Router	Kahuna As VDCP Video Desk				Sage EAS
	Philips ES Switch Router	EVS AVSP				
	GVG 7000 Native Router	P-Bus				
	Quartz T01 Router	NEXIO Native				
	UTAH Scientific RCP-1	Chyron Graphics				
	Harris (Pass-Through)	LiveTouch				
	NP0016-00	LiveTouch Minipic				
	NP0017-00D Port					
	NP0017-00D Device					
	GVG7000					
	UTAH RCP-3					
	UTAH RCP-3A					

Serial Protocol Setup Example

> Note: Depending on specifications of the Kahuna mainframe purchased, this will dictate how many RS422 protocol ports are active.
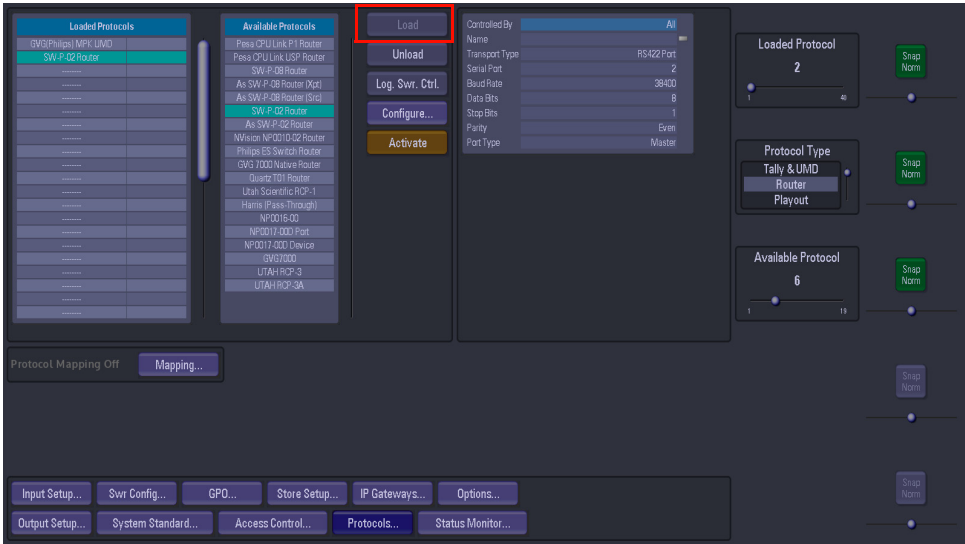
The **Loaded Protocol** parameter table lists the protocols that have been loaded. The **Protocol Type** parameter is used to scroll through the protocol sets. When the required "Protocol Type" is found, then use the **Available Protocols** parameter to scroll down to find the required protocol. Use the **Available Protocol** parameter to scroll to the required protocol and then press the **{Load}** button.

> Note: The the number of protocols available to the user depends on the protocol options purchased with the system.
> In this example the Tally & UMD - GVG (Philips) MPK Tally, protocol is being used.
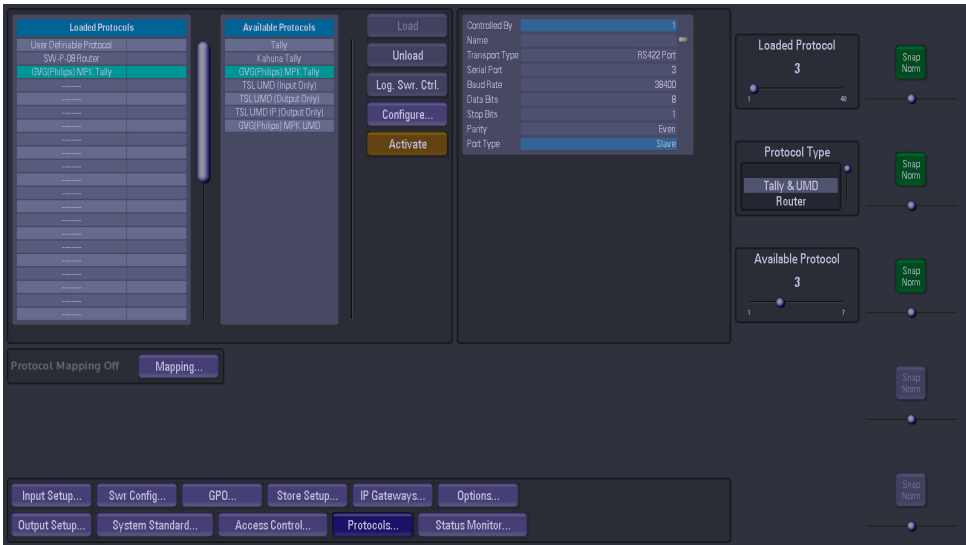
After the load button is pressed, the selected protocol is placed in the **Loaded Protocols** table and a new table is added to the menu, the table displays specific information related to the selected protocol.

If the settings need to change, press the **{Configure}** button to enter the Protocol Config menu.
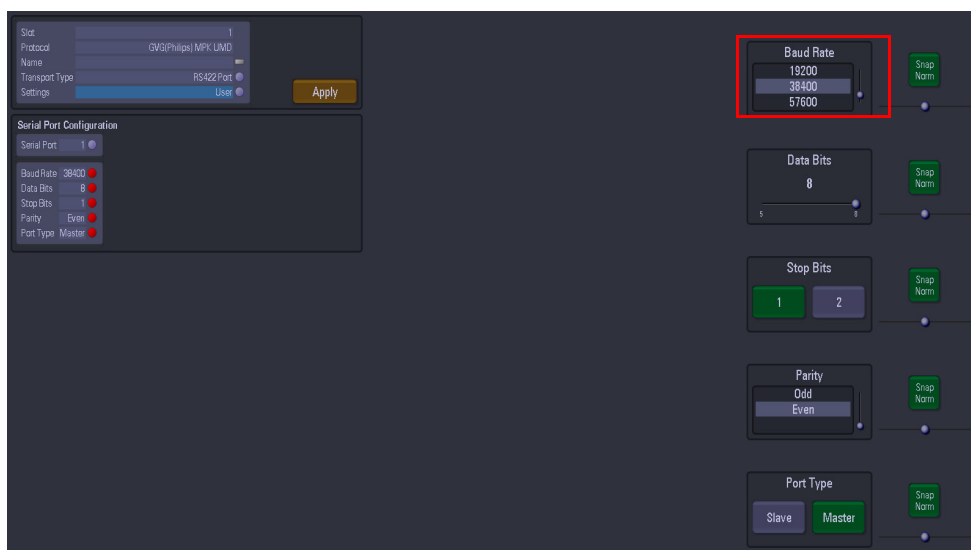
The user is able to select the type of connection that is required (Transport Type) i.e RS422 Serial, IP and RS422 (IP).

The "Settings" parameter allows the user to chose "**Default**", as the name suggests is the default setup for an RS422 port to communicate with an external device, many devices will work with this setting. If a user specific setup is needed, touch the **{User}** button in the **Settings** parameter, the user is now able to setup the protocol as required, as shown in the menu below.
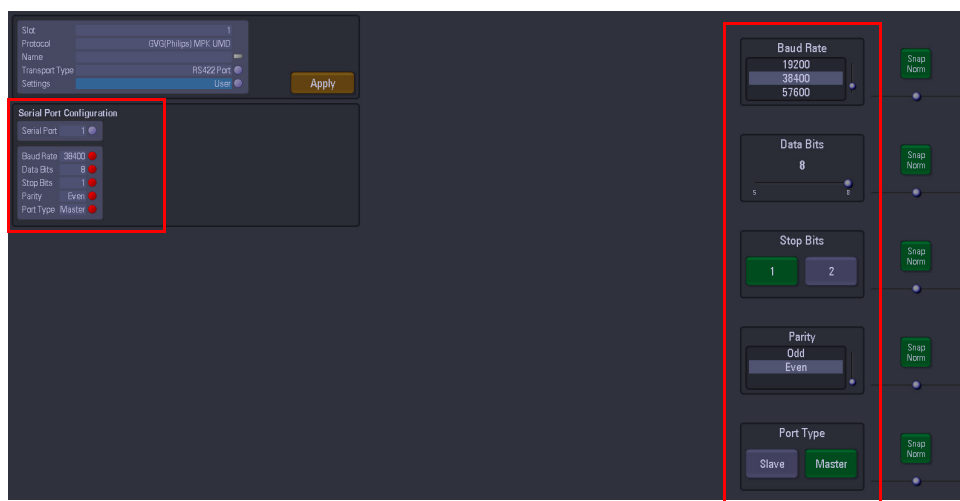
When the parameters have been set correctly press the **{Apply}** button. The menu will now return to the main menu.
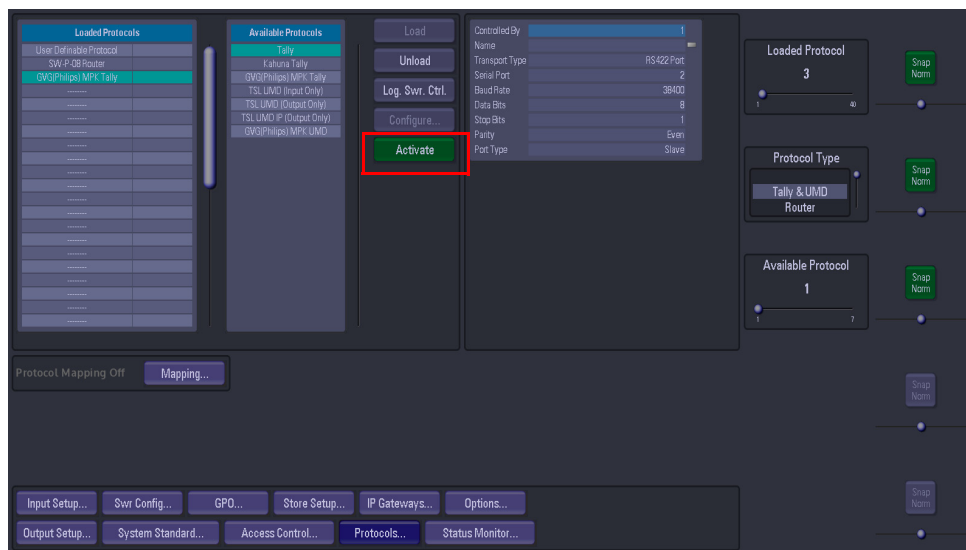
If happy with the protocol setup information press the **{Activate}** button and the system will connect to the external device if all the setup information is correct.

Options

This menu is used to install new software options that upgrade the Kahuna mainframe, e.g. installing protocols, Extreme M/Es, or installing extra inputs and outputs, these are just a few examples of the many options available to the Kahuna.
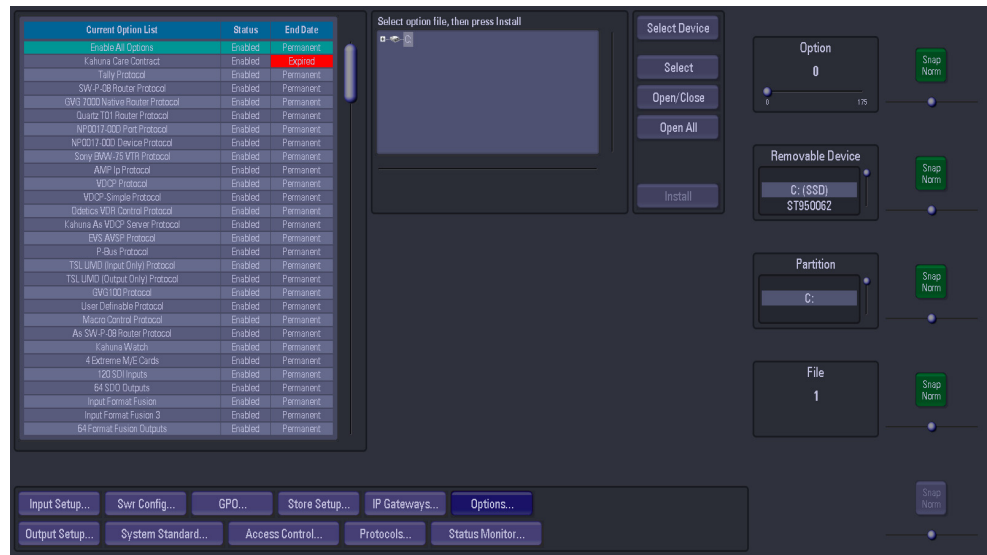
Installing Options

Place a USB memory device with the option file/s into the USB port.

Touch the **{Select Device}** button and the USB device can be selected allowing the option file to be located. If there is more than one file on the USB device then use the **File** parameter control to select the required option file.

Touch **{Select}** to select the new option file, finally press **{Install}** and the option file will be installed into the mainframe.

Note: After installing a new option, the mainframe has to be re-booted.

Status Monitor

The Status Monitor function monitors the overall health of the mainframe allowing the user to easily see any power supply, fan or card (PCB) problems in the unlikely event that the Kahuna mainframe should have a fault.
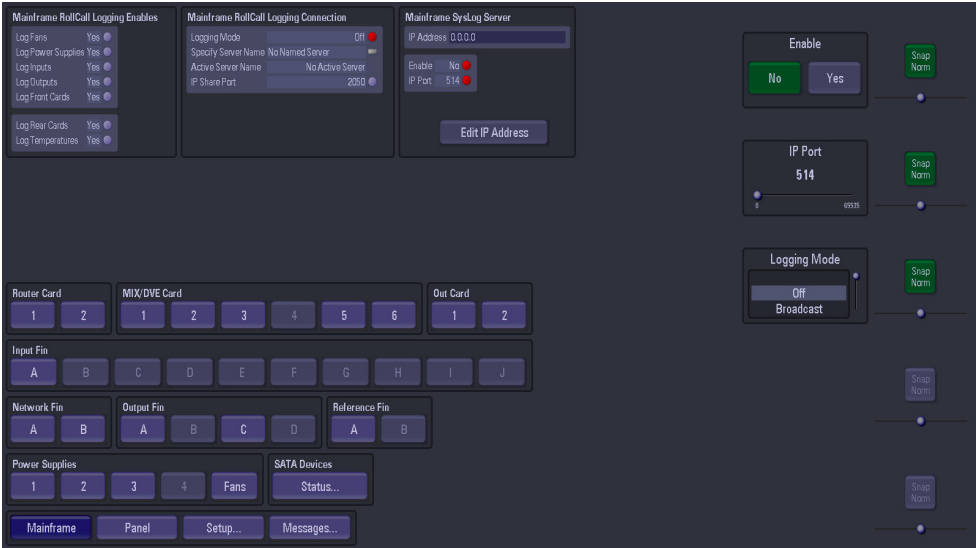
The main status monitor menu allows you to have access to the display the status of all the internal cards in the mainframe, the power supplies, fans, input and output Fins.

> Note: In the example below the Mix/DVE Card button 1 has been pressed.

Indicates what the Card is used for
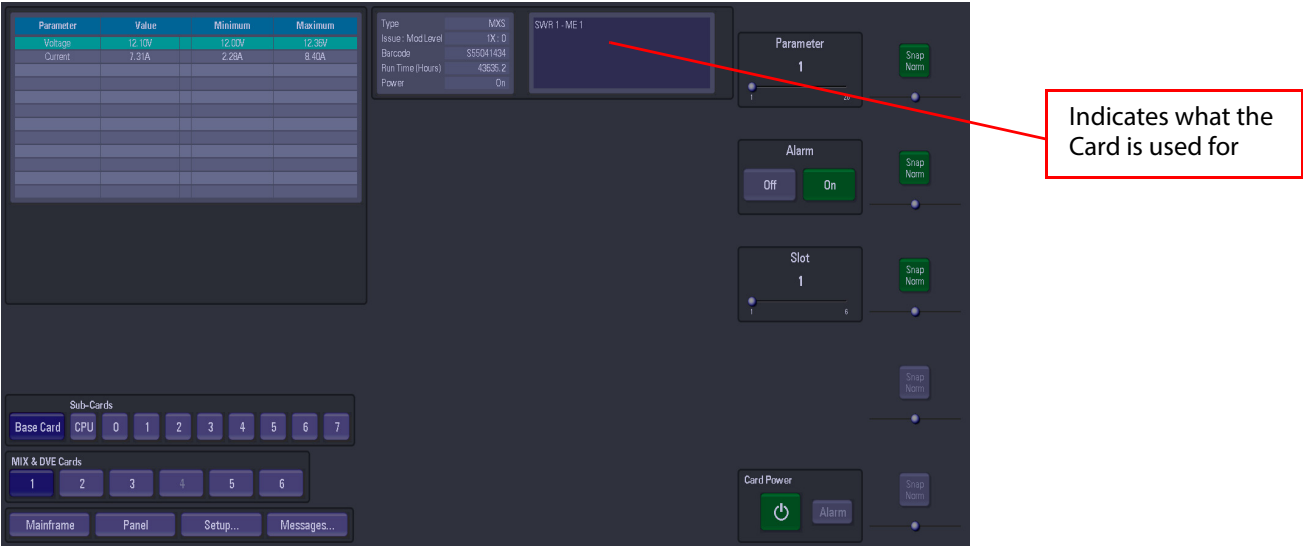
The Base Card menu displays the voltage and current on the M/E card, the table displays the operating voltage and current at the present time, and the max/min. values that have reached during the boards working life. The alarm is set to On so that if the voltage or current goes over a value specified by the factory then the alarm will go off and the warning box at the top left of the menu will have a warning note.

The warning will be displayed in all menus whilst using the system until something is done to sort the problem out.

Pressing the **{CPU}** button in the menu will display the current operating temperature of the CPU, the board temperature and all the voltages related to the CPU.
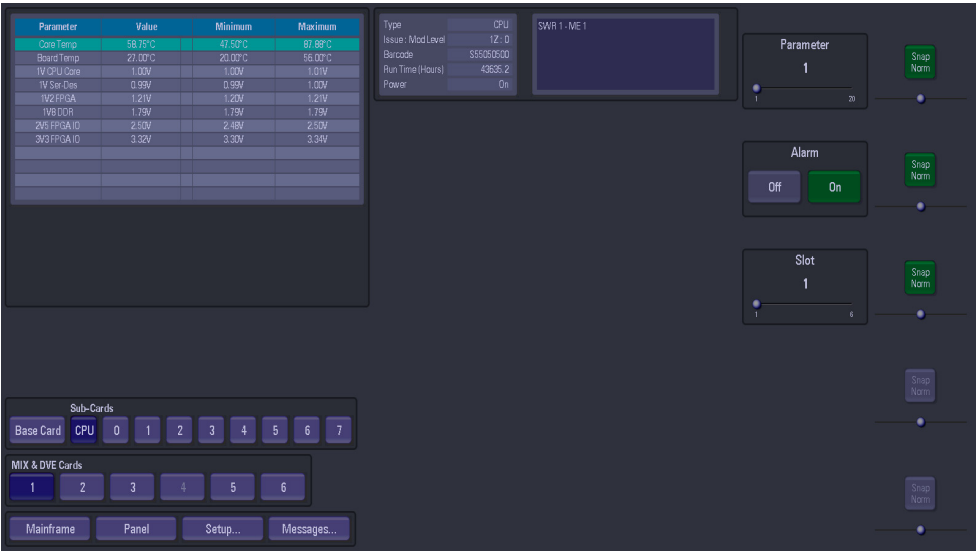
The next layer down in this menu monitors the temperature and voltage of the GMCs.
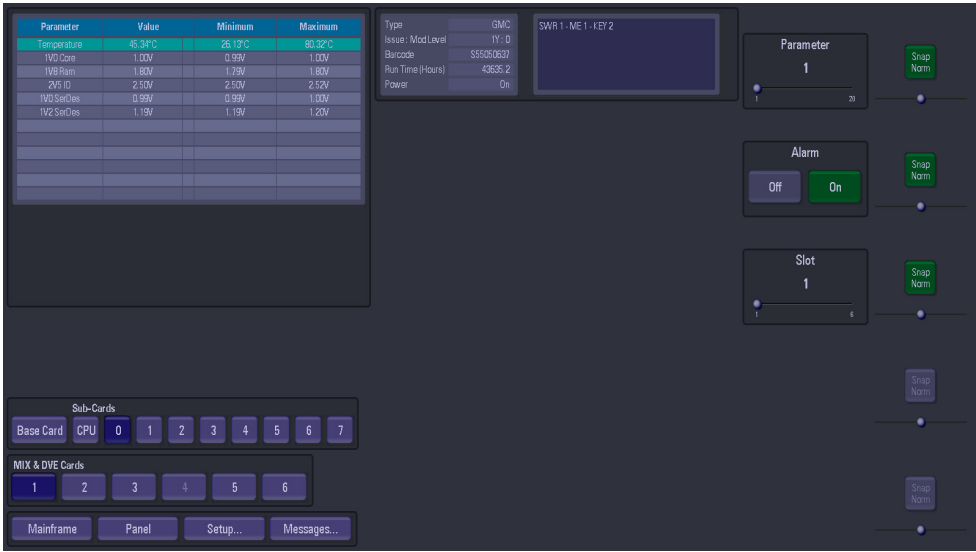
The other monitor menus within status monitor all work in a similar way all giving similar information to the user.

Powering Down a Card or Fin

With the exception of Router Card 1, all of the cards and all of the rear Fins can be powered down, so that they can be removed and replace without having to power down the mainframe. Obviously depending on the card or fin being removed will depend how the operation of the system is affected.

Cards and fins that can be removed will have an On/Off button in the bottom right corner as shown below. Pressing the On/Off button will bring up a warning dialog box, asking the user if they are sure that they want to power down the card/fin.
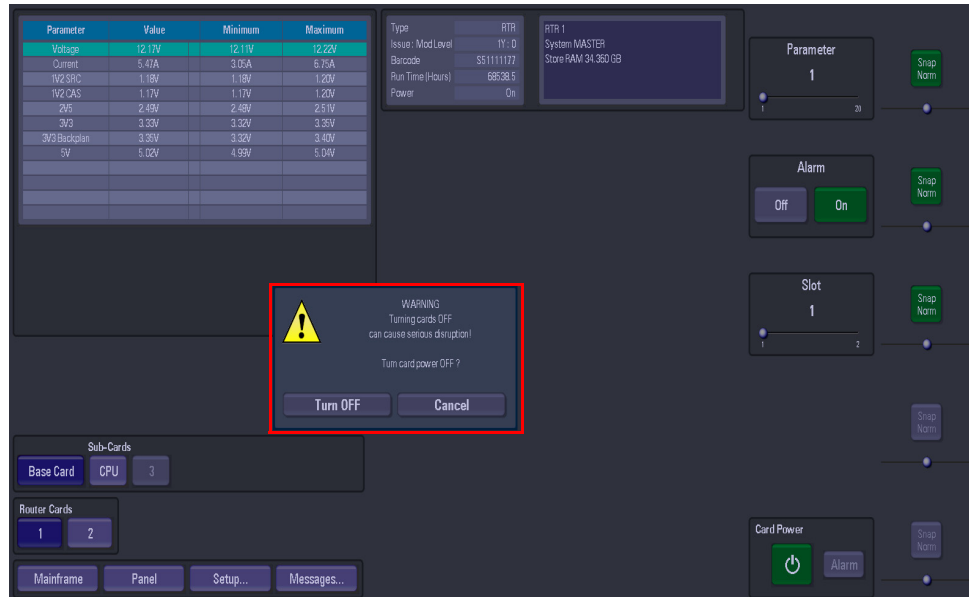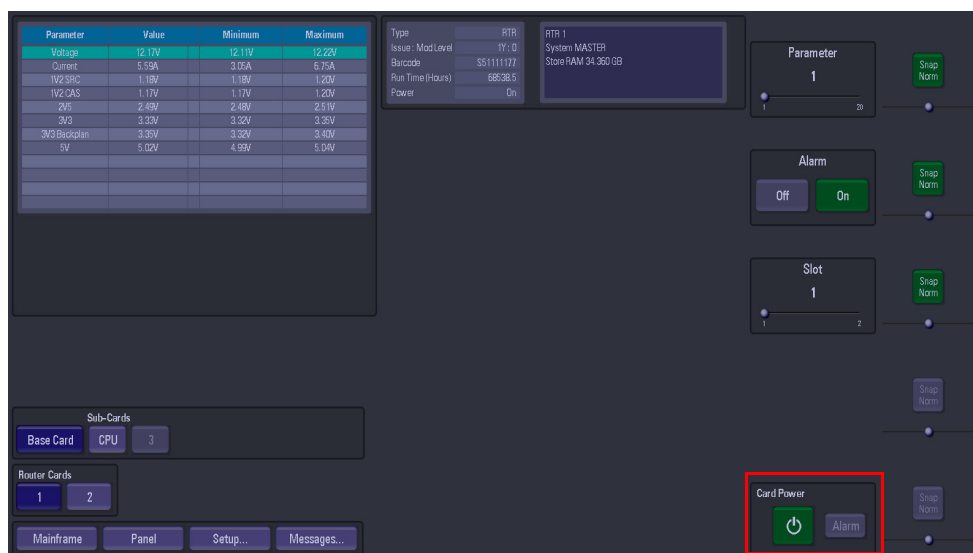
Press the **{Turn OFF}** button in the dialog box and the card or fin will power down. Once the card or fin is replaced, the card/fin will power up automatically and begin normal running. The power up sequence will only take a few seconds.

Setup Menu

The **Status Monitor - Setup** menu allows the user to set the maximum values for temperature, voltage and fan warnings before the alarm status is reached.
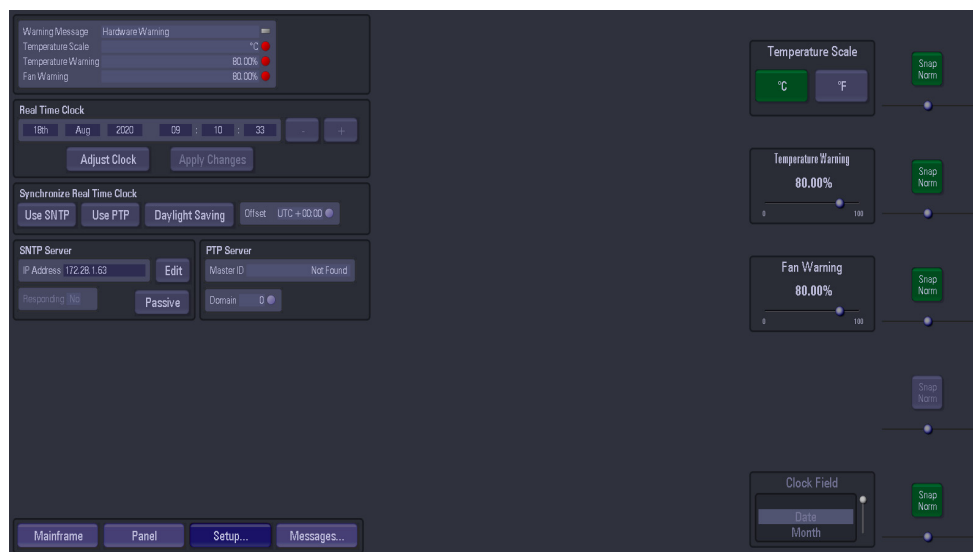
The default setting for all the alarms is set to 80% of the factory maximum limit.
The warning message can be changed to what ever is needed; the temperature scale can be changed.
The "Real Time Clock" can also be set manually by touching the **{Adjust Clock}** button and then adjusting the Day, Month, Year and time using the **{-/+}** buttons.

The Real Time Clock can also be synchronized by connecting to an SNTP or PTP server.

SNTP (Simple Network Time Protocol) - is based upon the TCP/IP protocol suite. It is an application layer time protocol, part of the Network Time Protocol base protocol. Along with NTP, SNTP communicates using the User Datagram Protocol (UDP). On receipt of a response from the server, the Kahuna can calculate the system time offset between its internal clock and the servers clock.
Use the SNTP Server parameters to enter the IP address of the SNTP server.

PTP (Precision Time Protocol) - provides a mechanism for distributing common reference clock throughout the system. Kahuna maintains an internal clock that can be synchronized to this common reference clock. RTP timestamps within the RTP packet header (and extended header) is used for synchronization. Synchronization across multiple essence streams is achieved by comparing the offset between the RTP timestamp and clock.

Messages

The Status Monitor - Message History menu will display a history of any significant events or hardware warnings with the time and date against them.
In the unlikely event of a problem, this menu can be used as a high level review of any possible failures. For more detailed information please use the Export Status Log Files option in the Mainframe Configuration menu.
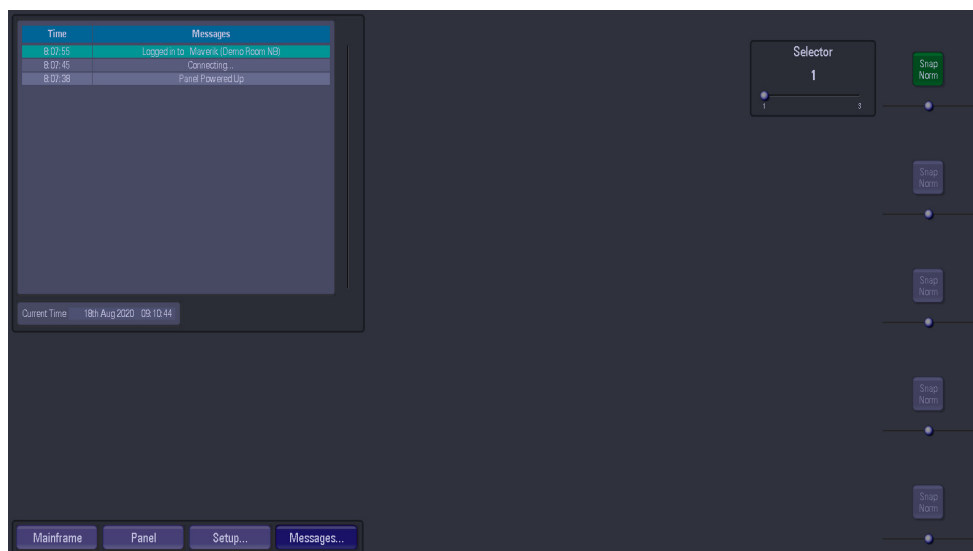
RollCall Logging

By Default, all RollCall Logging is switched On (Yes) to broadcast for the Kahuna mainframe.
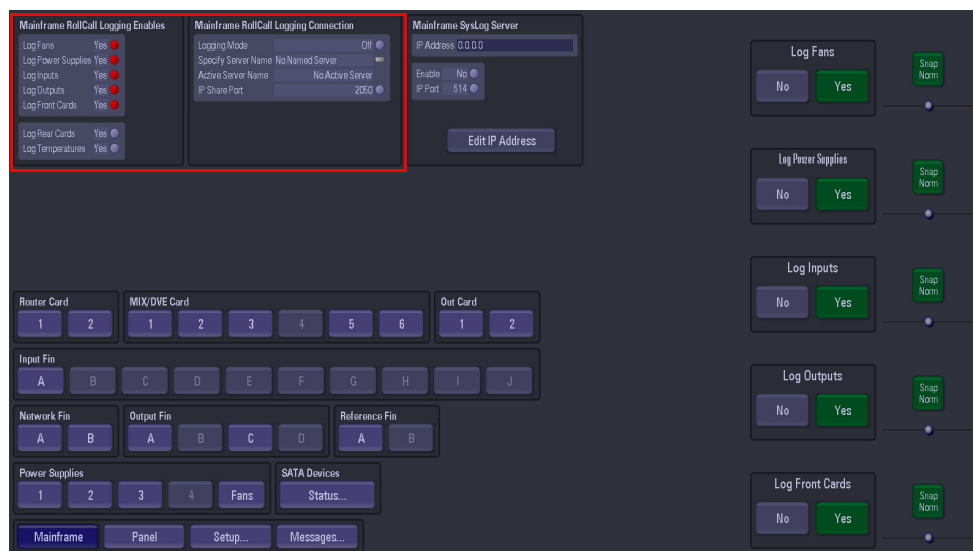
Via the "**Mainframe RollCall Logging Enables**" parameter, the user is able to enable/disable Fans, Power Supplies, Inputs/Outputs etc. The "Mainframe RollCall Logging Connection" parameter, allows the user to turn "**Off"** logging or select "**Broadcast"** to broadcast out to all available log servers, or select "**Named Server**" broadcast to a named server only.

RollCall Logging - Setup Menus

The **RollCall Logging** set up menu is part of the Status Monitor main menu.

Using the "**Mainframe RollCall Logging Enables**" parameter, the user can select what type of panel data they wish to be logged. In the right hand section of the menu they can select the type of RollCall connection. In both **Broadcast** and **Named Server** mode, a text box indicates the name of the Logging server that the panel is currently communicating with.

Syslog

The Kahuna family of switchers and control panels is now capable of using an external Syslog server to save its diagnostic output. In the unlikely event of there being a problem with a Kahuna system, Syslog can be used to display error log files.

Connection

To use Syslog, a computer needs to be connected to the Kahuna mainframe via one of the Net Fin RJ45 network ports (as shown below).
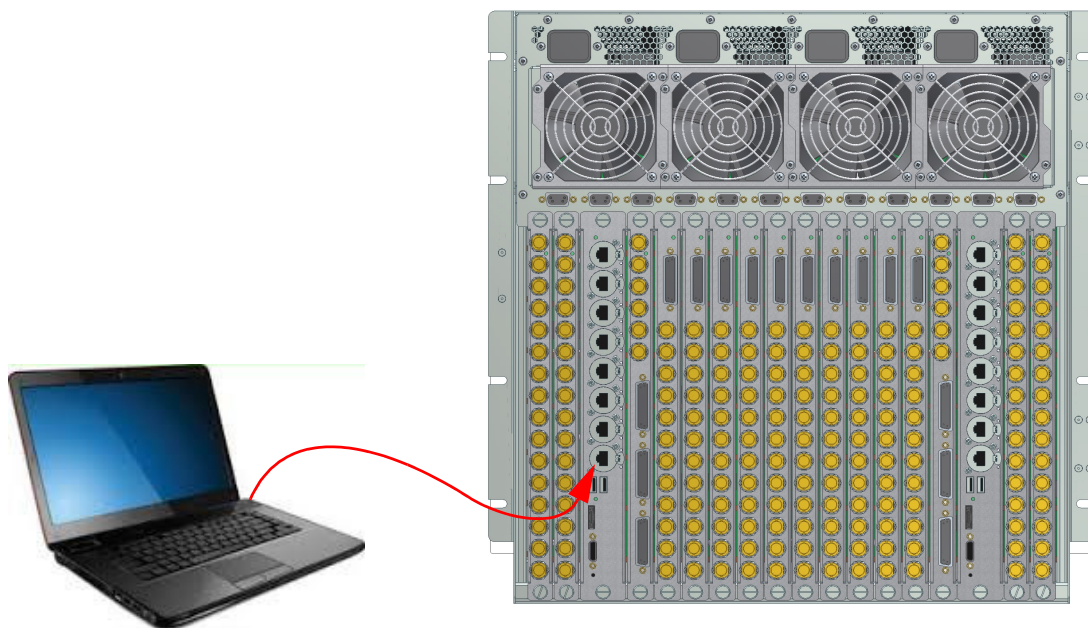
IP address

The next thing to find out is the IP address of the computer being used. If the IP address is not static, then open a Command Prompt.
If using a Windows^{TM} operating system for example, in the command prompt window type:
`>Ipconfig /all`

In the message list look for:

"`Ethernet adapter Local Area Connection`"

Then look for "`IPv4 Address`" It will show (for example) 192.28.7.7

Make a note of this address.

Kahuna Setup

The next, setup the connection between the computer and the Kahuna mainframe.
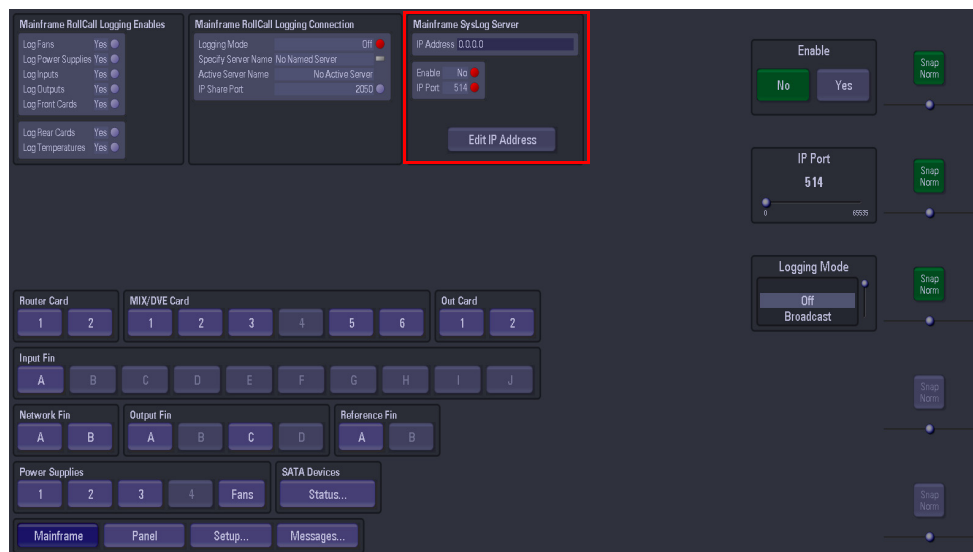
Touch the **{Edit IP Address}**, then enter the IP address of the computer.
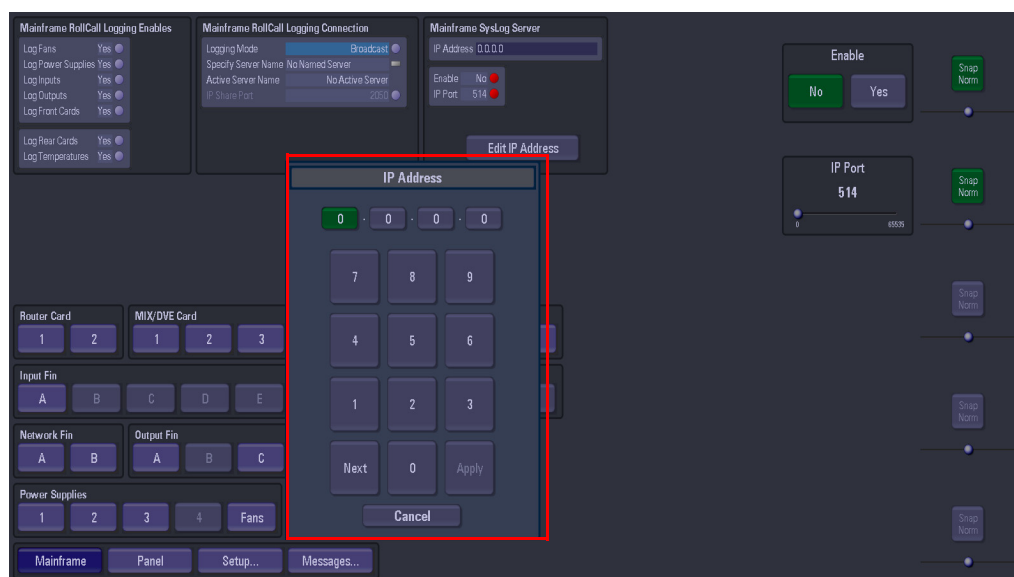
In the menu, use the "**IP Port**" parameter to set the port number. It is set to "**514**" as a default, but it can be changed to a user defined number.
Set the "**Enable**" parameter to "**Yes**".

Syslog Application

There are many Syslog servers available on the Internet, they are suitable for a variety of platforms (Windows, Linux, OS etc).

This example uses a generic Syslog Server application.
Once installed open the Syslog application.
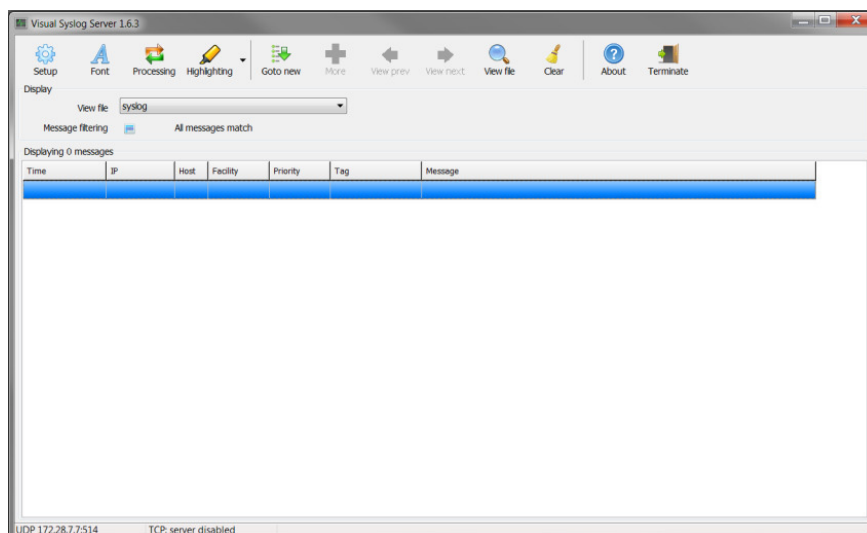
Select setup.

Enable UDP Listener, then set the IP Address to be that of the computer. Set the port number to be 514 (or what ever it was set to on Kahuna).

> Note: Usually, Syslog servers will use UDP port #514, although they will offer the ability to change this port, allowing the same machine to run multiple Syslog servers simultaneously.

Click on **{OK}** and the Syslog software should now start receiving messages from Kahuna.

The job of a Syslog server is to open up a network port and log all Syslog format messages that are received at the port; in this example from Kahuna. Usually, messages are recorded continuously into a file or files on the disk.

The log file may be restricted to a maximum size and can either be used as a circular-buffer or a new file can be started when the maximum size is exceeded or when a time duration has passed (e.g. start new file each week or if the file exceeds 10Mbytes).

Logged messages can be color-coded by severity. They can also be filtered and sorted by who sent them, their severity, time stamp etc.
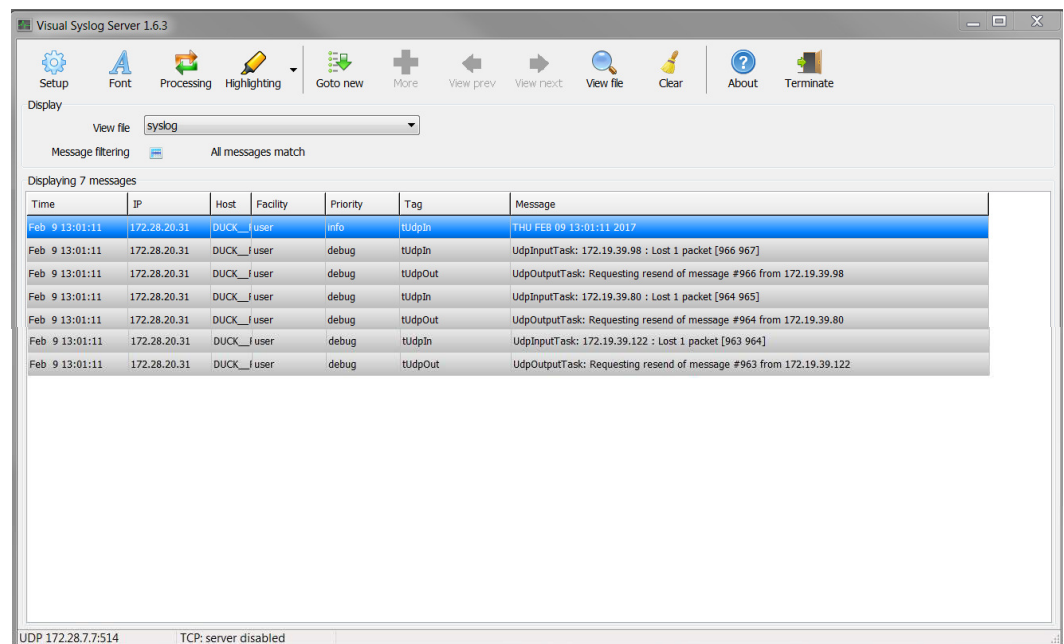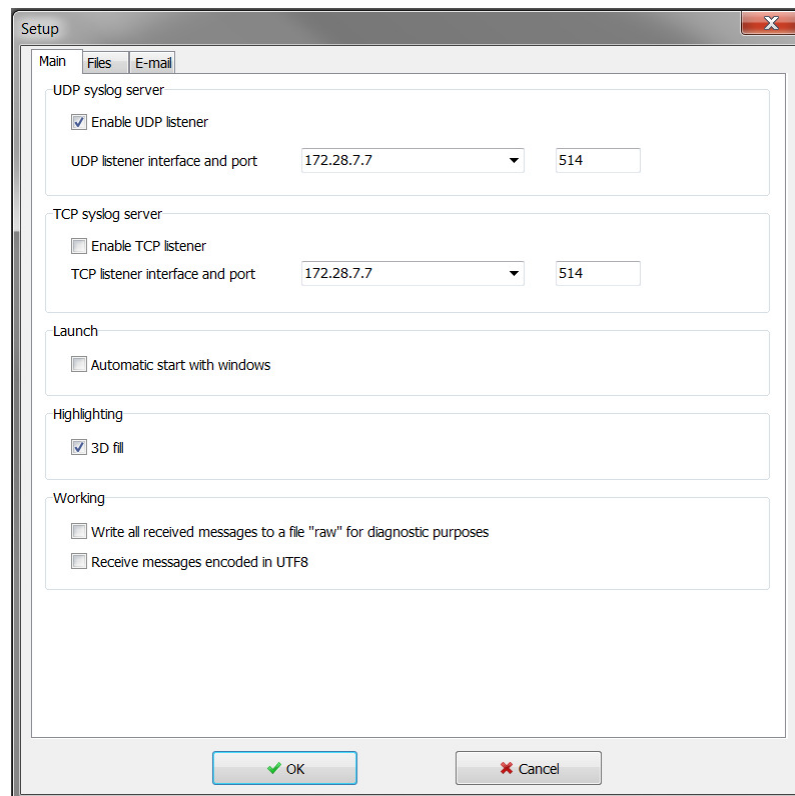
User Configuration

User Config Overview

Touch the **{USER CONFIG}** button on the GUI panel to enter the User Config menu. In this menu up to 1000 (0 to 999) user specific User Config files can be saved into a Project and is one of the most important menus for the user when setting up Kahuna.

Saved User Configs

Current Project
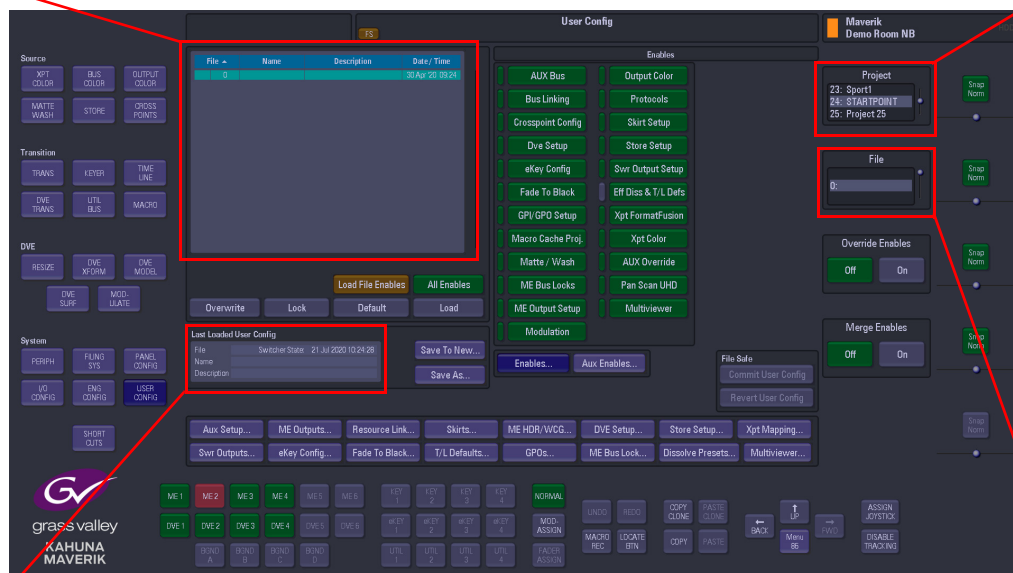
User Config Details

Current User Config File

User Config Main Menu Description

The User Configuration is one of 4 main configuration functions on the Kahuna mainframe and is an integral part of the system setup. In this menu the M/E Outputs, Switcher Outputs, Aux Setup and Store Setup are some of the main engineering functions, so it is important to understand how to navigate the main menu to learn how to Create, Save and Load user specific configurations.

Create a New User Config

To create a new config file, you can either touch **{Save To New},** where the User Config file will be saved to the next available slot in the file list, or touch the **{Save As…}** menu link button. Both options will display the "**User Config - Save As**" menu. The menu displays all the saved User Config files within the currently selected "**Project**".
If you wish to change to a different project to save the user config file, use the "**Project**" parameter to select a project, and then use the "**Destination**" parameter to scroll down to an empty row in the table. Use the "**Name**" and "**Description**" attachers with the on-screen keyboard to add a name and description. When finished touch the **{Save}** button to save the new file into the table.

Enables & Aux Enables

This menu allows the user to enables/disable certain functions that are related to the User Config setup, such as Aux Buses, Crosspoint Config, M/E Output Setup, Xpt FormatFusion and Multiviewer setup etc.
The small green tab next to the function enable button will display if a function has been saved with a panel config file or not. If the tab is gray, the function next to it is not included in that saved panel config file. De-selecting an enable will mean the function will NOT be included when saving the User Config and subsequently; NO change will be applied to that function when loading that file.

Loading a Pre-saved User Config

To load a pre-saved User Config files, scroll up and down the File parameter control to reach the required file, then press the **{Load}** button.
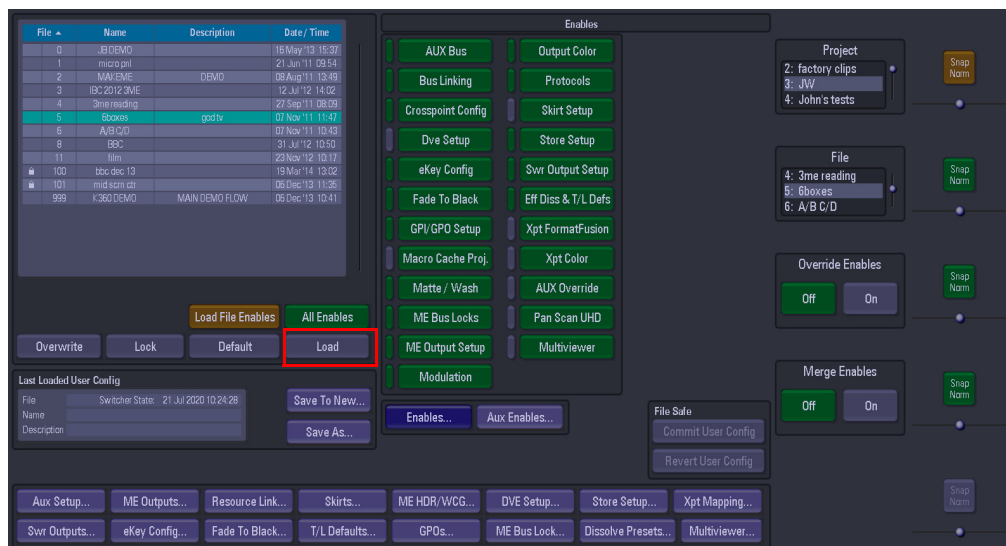
Note: It is advisable that after any change to a file in the User Config menu to save the configuration!

Override Enables - will override any enables that have been de-selected and turn the enable on.

Load - will go back to the main User Config menu and load the selected/de-selected enables configuration into a configuration selected in the main User Config menu table.

Save - will open the Save As menu, so that the user can save the selected/de-selected enables into a User Config.

Merge Enables - this function merges the enables currently set in the switcher with the enables saved in the file that is being loaded (a 'logical OR' of the enables).

Aux Setup

In the User Config main menu, press the **{Aux Setup}** button to enter the **User Config - Aux Setup** menu.

In this menu, the exact setup for each individual Aux Bus can be adjusted. The center of the menu screen shows a table, which contains each Aux Bus details. The attacher boxes at the bottom of the screen contain the individual parameters controls.

> Note: Setting up the Auxes will be reflected on the MAV-AUX panel if the control surface has one fitted.
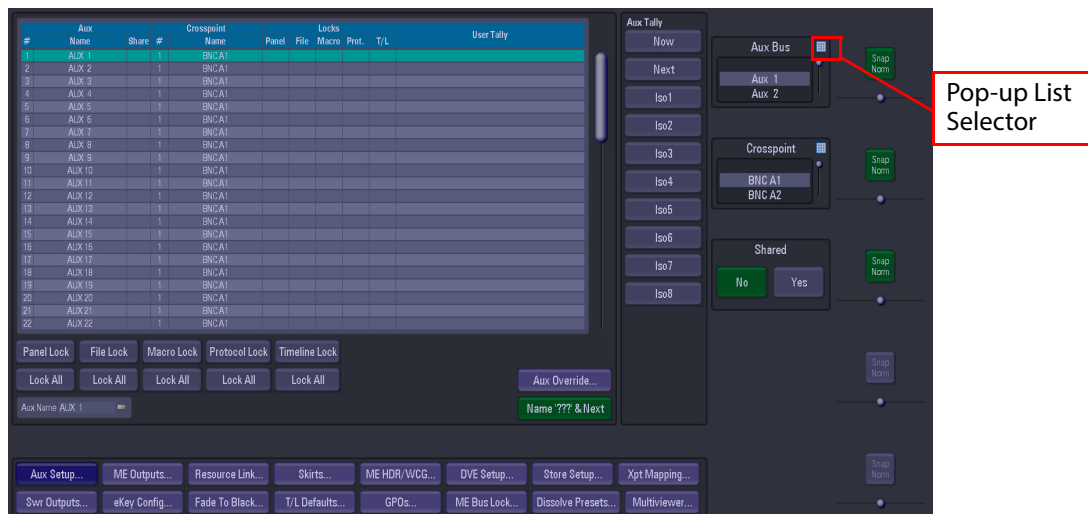
The Kahuna mainframe has freely assignable outputs; which means that any output can be assigned to be either a M/E output or/and an Aux output using the **Swr Outputs** menu in the **User Config** menu. The table in the center of the menu displays the setup of the Aux Buses and the sources that are assigned to them.

Sources for the aux buses can be M/E output Xpts, Store Xpts or any of the sources on the 160 Xpts.

Setup an Aux Bus

To setup an aux bus, use the **Aux Bus** parameter to select the required aux and the **Crosspoint** parameter to select the source for the aux bus or use the pop-up list selector to quickly select the required source.

The final part of setting up an aux bus is to assign it to an output, this is done in the **User Config - Swr Outputs** menu.
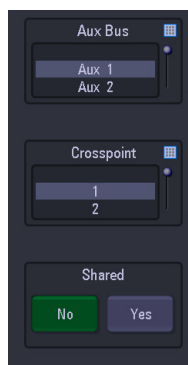
The above parameters are used to selected Aux Bus and the Crosspoint source to the aux bus. The **Shared** parameter allows or stops an aux bus being shared with another logical switcher.

The Lock parameters are used to lock out specific functions on an Aux panel.
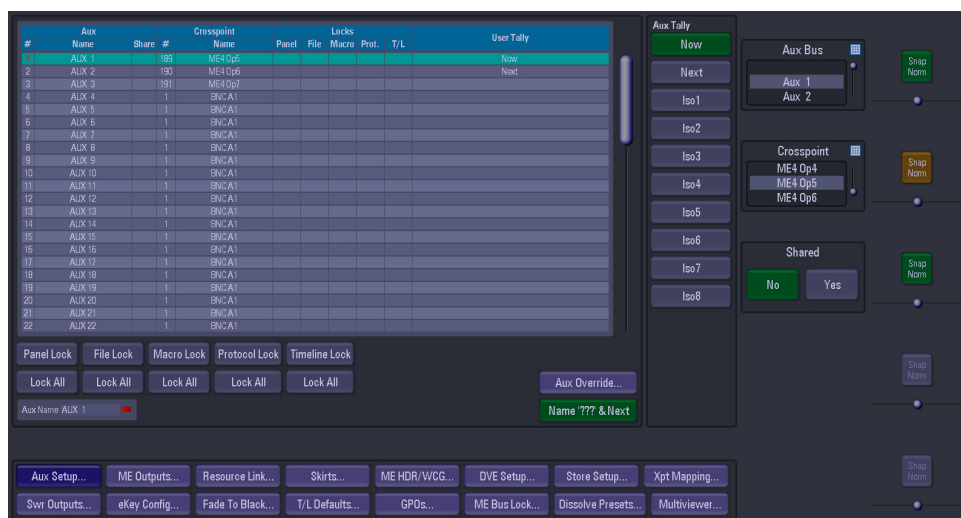
The **Panel Lock**, lock out the selected crosspoint assigned to the Aux Panel so that when the button is pressed, the crosspoint does not operate.
File Lock stops the user from loading a file.
When a Macro is attached to a crosspoint, the **Macro Lock** parameter disables the crosspoint so that the attached macro cannot be triggered to run.

Swr Outputs

The **Switcher Output Config** menu is where all the output sources are setup. It is used to assign sources such as M/E outputs, Stores, Auxes, Washes, Mattes etc. to the output BNC's.
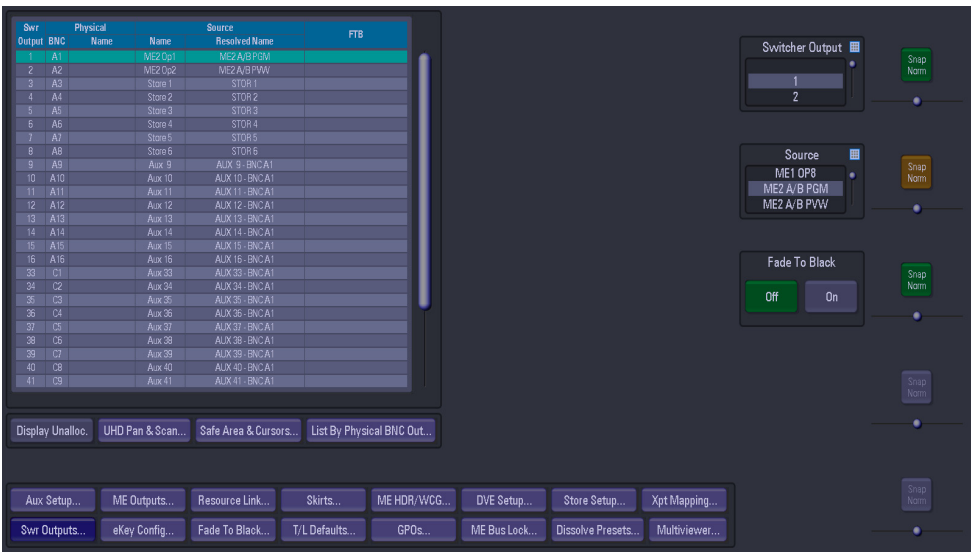
Setting up a Switcher Output

The table that takes up the main portion of the menu displays sources that are assigned to the physical BNC outputs. The default layout displays the BNC outputs as they would be seen on the output Fins on the rear of the mainframe in alphanumerical order, so the actual BNC outputs displayed will depend on the number of output Fins purchased with the mainframe.

The default setting for the menu is "**List By Physical BNC Output**" this displays the actual BNC outputs. **Display Unallocated** displays the full BNC output layout as if all output Fins are fitted to the mainframe.
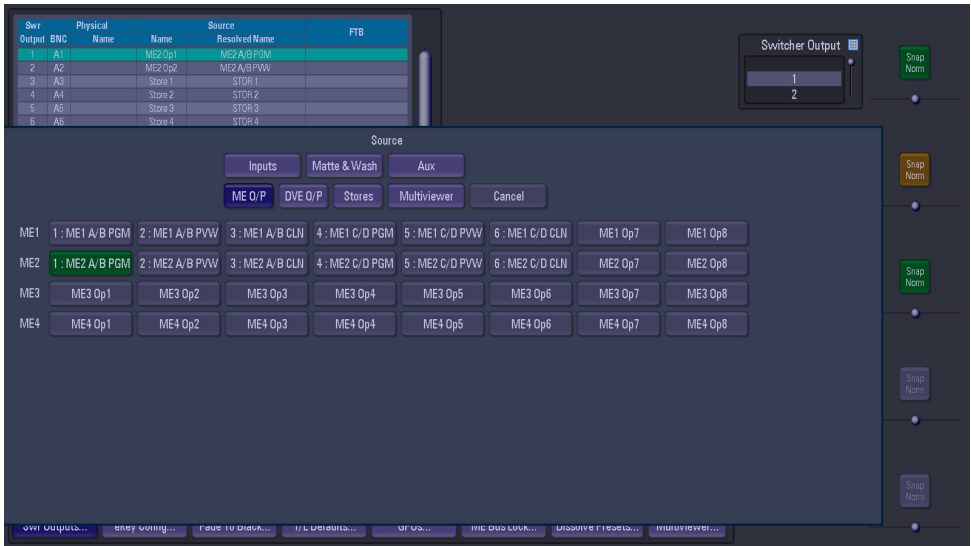
Use the "**Switcher Output**" parameter or popup to select an output, then use the "**Source**" parameter or popup to select the source for that output.
The table columns from left to right of the menu display the following information:
Swr Output is the output designated in the Mainframe Config menu and depending on the way that the mainframe configuration is setup may not run sequentially. If for example Swr Output 1 has been moved to BNC A12, A12 will have an astrix (A12*) next to it to signify that it has been changed.

BNC is the physical BNC numbers as displayed on the output Fin at the rear of the mainframe.
Name is the name that has been given to the BNC output in the Eng Config - Output Setup menu.
Name is the default name given to the source.
Resolved Name is the user specific name given to the source in the User Config - ME Output Config menu
FTB displays if Fade To Black is enabled for the selected output.

The **Switcher Output** parameter allows the user to select a physical BNC connector on the back of the Kahuna mainframe, then using the **Source** parameter the user can assign a source to the selected BNC output.

The user can also assign **FTB** (Fade to Black) to any of the outputs as required.

Safe Area

Safe area is used to superimpose a grid on a monitor display to ensure that a signal source and title area is setup correctly and is the correct aspect ratio. The use of safe areas in television production ensures that the most important parts of the picture are seen by the majority of viewers.
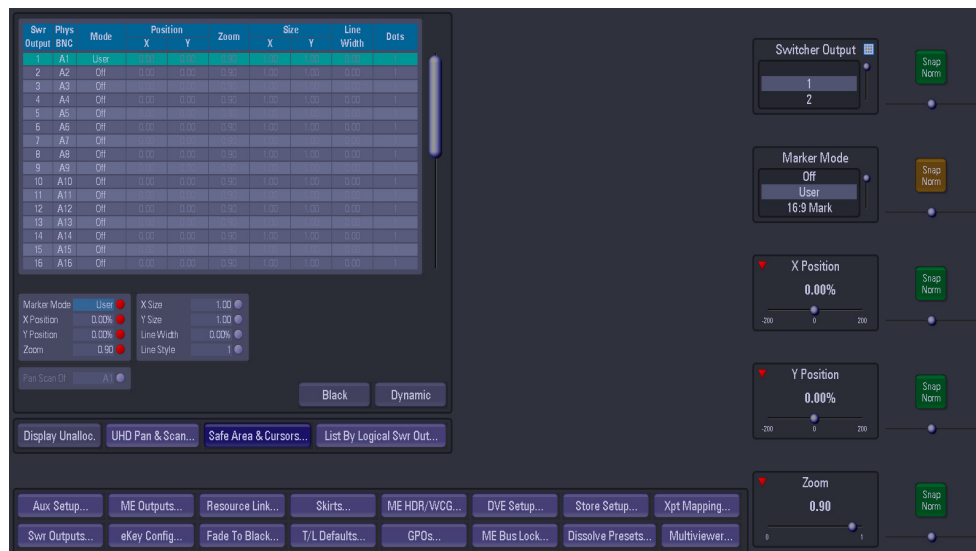
Safe Area can be set independently for all outputs using the **BNC Output** parameter. There are various **Marker Modes** that safe area can work in:

User - allows a user defined safe area setup, where the safe area lines can be moved around the monitor with the X/Y Position parameters, the save area can be zoomed in or out, the length of the safe area lines can be adjusted using the X/Y Size parameter, the line width can be changed and the Line Style can be changed.
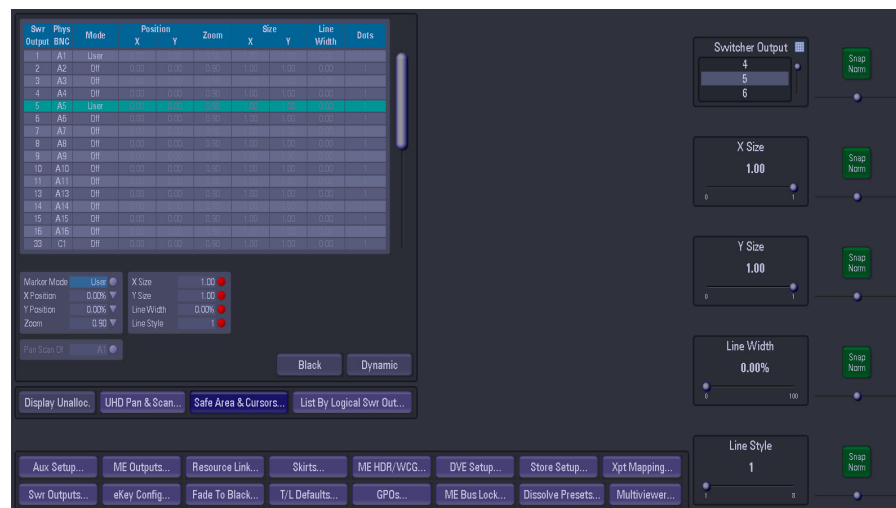
The following settings are in 2 groups of 4.

- 16:9 Mark, Box, Action and Title
- 4:3 Mark, Box, Action and Title

Mark - adds a line outside the safe area.

Box - places a line 1 pixel inside the safe area

Action - is a larger area outside of the Tile safe area.

Title - the title safe area is, in broadcasting, a rectangular area which is far enough in from the four edges of the selected aspect ratio, to allow text or graphics show neatly, with a margin and without distortion.

M/E Outputs

Kahuna has a maximum of 64 outputs (depending on the system configuration purchased) all of which are programmable this means that the user is not restricted and can assign any one of the outputs to be an M/E output. All M/E outputs are programmable which means that the outputs can be configured and their states changed; in this menu, to suit the users needs.
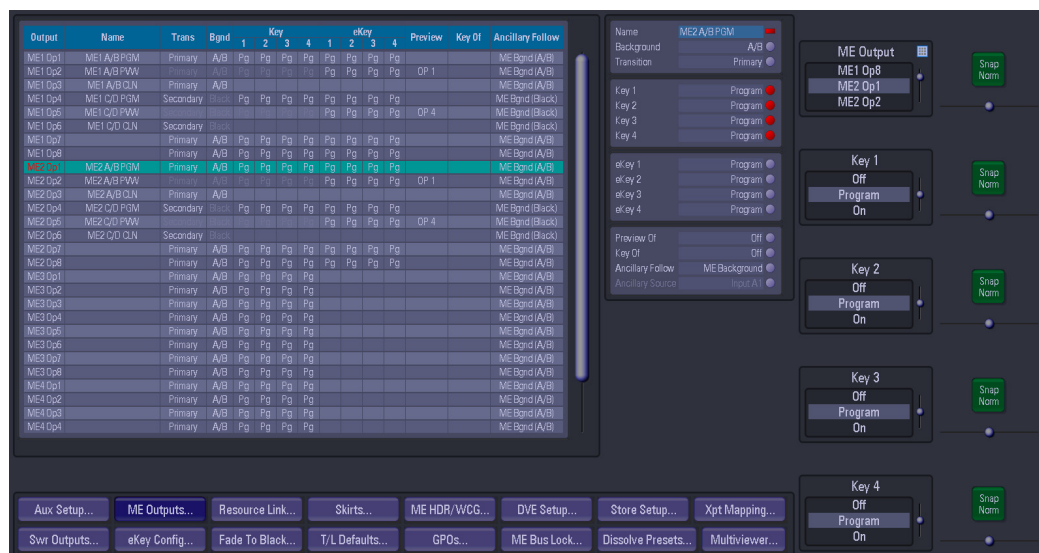
Output - The number of M/Es in this menu are dependent on the way the system has been setup and the number of M/E cards purchased with the system. There are 8 M/E outputs per M/E which are configured in the Mainframe Config/Switcher Config - Make M/E menu.

Name - This is the user assigned name for the M/E output

Trans - this selects the Primary or Secondary transition settings for the selected background bus. **Primary** and **Secondary** is explained for example when M/E 1 is selected using the Dynamic Mix Effect buttons on two M/Es on the control surface, M/E1 O/P1 with A/B background Primary is set.
When the Transition controls e.g. Wipe/Mix etc. are selected, the transition functions for both M/Es on the control panel will behave in the same way, as will all M/E 1 outputs.
If M/E1 O/P 1 is set to primary and M/E1 O/P2 is set to secondary in the M/E Output Config menu - secondary is selected by toggling the OLED button, the secondary will then transition either mix or wipes.

Background - This sets up which bus/buses are used as the background.

Black= Background will always be black

A/B = The main A and B buses will be used as the backgrounds in transitions.

C/D = The C and D buses will be used as the backgrounds in transitions.

A= Just background A will be used and the background will not transition

B= Just background B will be used and the background will not transition

C= Just background A will be used and the background will not transition

D= Just background B will be used and the background will not transition

U1/U2 = Utility Bus 1 and Utility Bus 2 will be used as the background and transition with the selected background transition or this output. Util1 and Util 2 crosspoints can be selected on the main panel.

U3/U4 = Just Utility Bus 3 and 4 will be used and the background will not transition
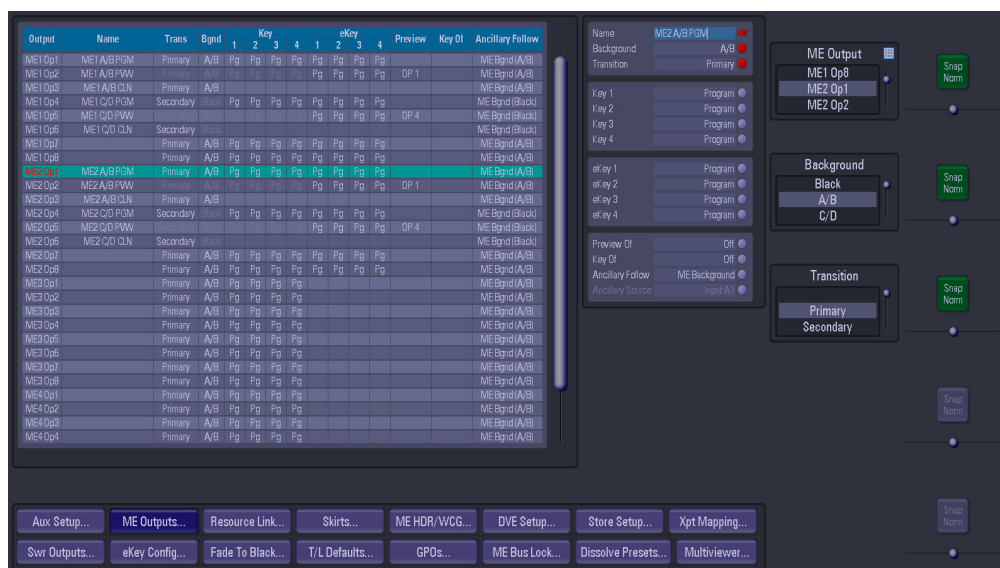
Key1 to Key4 - These columns determine what Keys will appear on the M/E output.

eKey1 to eKey4 - These columns determine what eKeys will appear on the M/E output.

> **Off** = This Key will NOT appear on this output

> **Program** = The Key is available on this output as determined by the transition status on the MAV-Trans module.

> **On** = The Key will always be present on this output. The main transition will NOT be able to remove it.
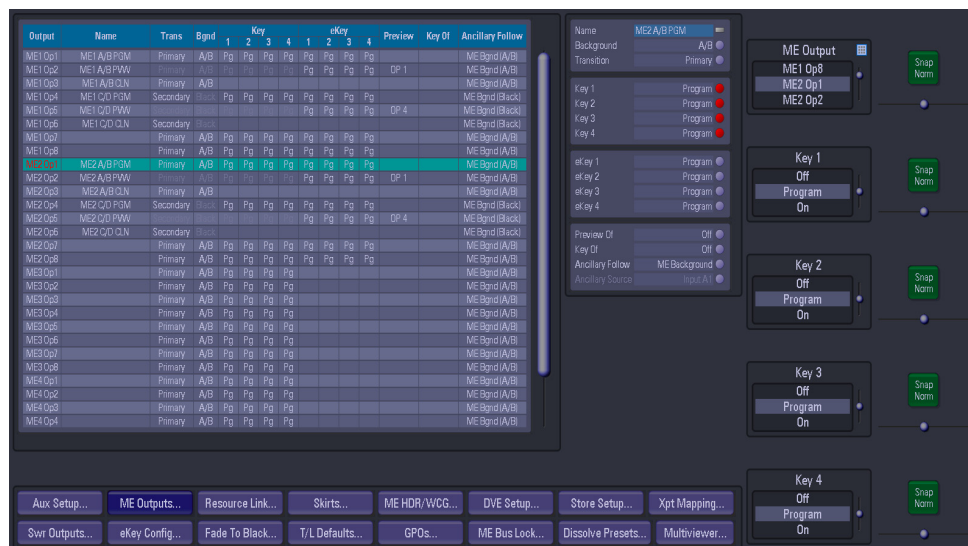
Name - This gives the User assigned name for the M/E output.

Preview Of - This sets this output to be a Preview for the M/E output you select. Previews can be re-entered but there will be no tally. Once you have selected this option all options to the right of this will have no effect.

Look Ahead Preview

Look Ahead Preview feature is designed for a facility that has a limited number of monitors, typically only one monitor per M/E which is used to view both Pgm and Pvw outputs for that particular M/E (with the exception of the output M/E, which normally has dedicated Pgm and Pvw monitors).
This feature automates the switching between the Pvw and Pgm outputs by monitoring the 'on-air' state of the Pgm output, selected in the Preview Of parameter for that monitor's output, and selecting the appropriate output type Pgm or Pvw.
Under normal working conditions, when the Pgm output of an M/E is on-air (tallied Red) its Pvw monitor will display the normal Pvw output for that M/E.
However, when its program output goes off-air, the preview monitor can be set to act like a program output for that M/E, effectively turning the Preview Of setting for the monitor output to the Off state.
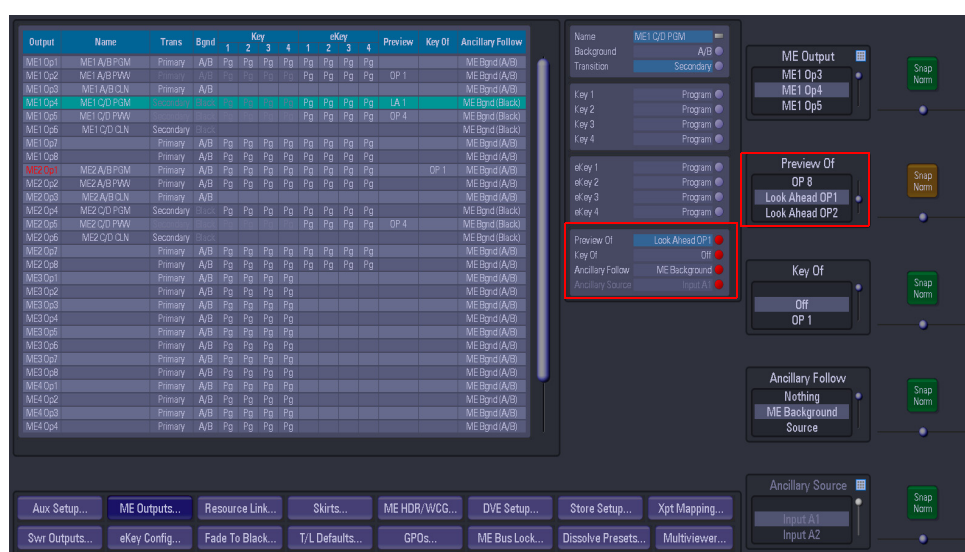
Using Auto Look Ahead

Example:

If M/E2 is the main output M/E, and M/E1 is a Key layer on M/E2.

If the Key layer is on-air, the monitor attached to ME1 will show the Pvw output for M/E1 since, by definition of the key layer being on-air, the Pgm output of M/E1 will be displayed on the Pgm output monitor of M/E4 (since it is the output M/E).

If the Key layer goes off-air, the monitor attached to M/E1 will switch to showing the Pgm output for M/E1, as it's no longer visible on either of M/E2's monitors.

Therefore; Pgm output of M/E1 on one monitor or another will always be seen, and M/E1's Pvw output will only be seen if M/E1's monitor isn't being used to display the Pgm output.

Setup

Select the M/E output that will be connected to the preview monitor highlighting the appropriate row in the table, e.g. ME1 Op4.

Set the Preview Of parameter of M/E1 OP4 to Look Ahead OP1 (abbreviated to "LA1" in table). This will monitor the on-air state of M/E1 Op1 and set M/E1 Op4 to be a Pgm or a Pvw output of M/E1 accordingly.

When M/E1 Op1 is on-air, M/E1 Op4 acts as a Preview Of M/E1 Op1, as if the Preview Of parameter was set to OP1. However, when M/E1 OP1 is off-air, M/E1 Op4 will switch to act as a Pgm output for M/E1, as if the Preview Of parameter was set to Off.

Key Of - This sets this output to be a Key Only for the output selected. Once you have selected this option all options to the right of this will have no effect. It is normal in this case that the background for the output you want this to be the Key for is set to Black. E.g. OP2 in this row would set this output to be the Key for output 2 of this M/E.

Audio Follow - All of the outputs on Kahuna can support audio as well as video, if audio is required on an M/E output, this parameter selects where an audio source will come from. Audio can be supplied via the following options: M/E Background, Bgnd A/B, Bgnd C/D, Bgnd A to C, Util 1 and 2, Keys 1 to 4 and eKeys 1 to 4.
If **Source** is selected in the **Audio Follow** parameter, the **Audio Source** parameter becomes active, this will allow the user to select a direct input to the mainframe as the audio source.

> Note: For audio to pass through the M/E output to the output Fins, the M/E is configured to an output BNC via the **User Config - Switcher Output Config** menu, then the **Ancil Audio** had to be turned On for the selected output in the **Eng Config Output Standard** menu.

eKey Config

> Note: Please read the Keying section of the manual in conjunction with this section.

A Kahuna has 8 Key layers per M/E made up of 4 SuperKey layers and 4 extra key layers that are called "**eKeys**". Each M/E will have 2 permanent eKeys, displayed in the eKey table as "**Real**" and 2 eKeys that are derived from Util buses, Background buses or SuperKeys that may not be required for a production.

When none of the Util, Background or SuperKey buses are being used by eKeys, the menu will look like the one below.
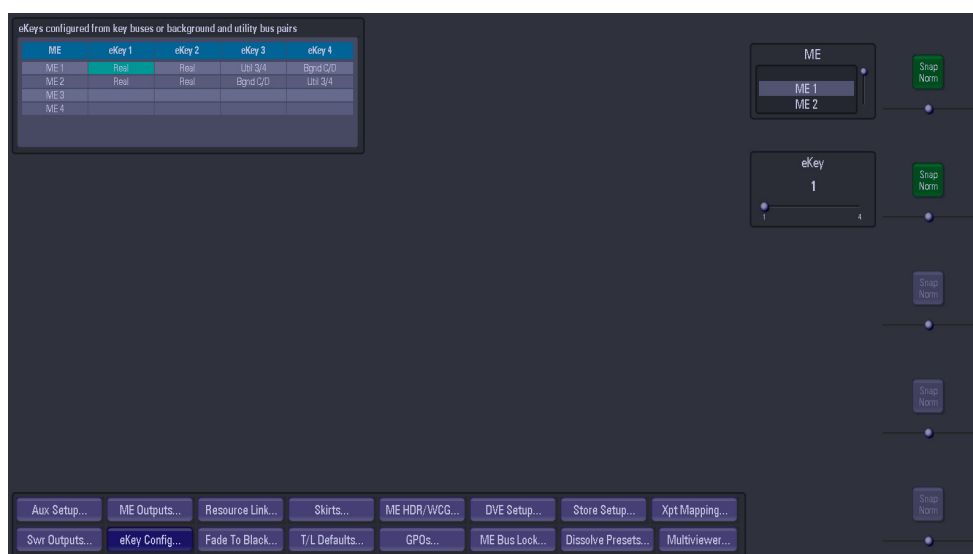
The menu will only display the available "Real" eKeys. If eKey 3 or 4 in the table is touched, then the menu will display the bus selection options to enable eKeys 3 and for each M/E.
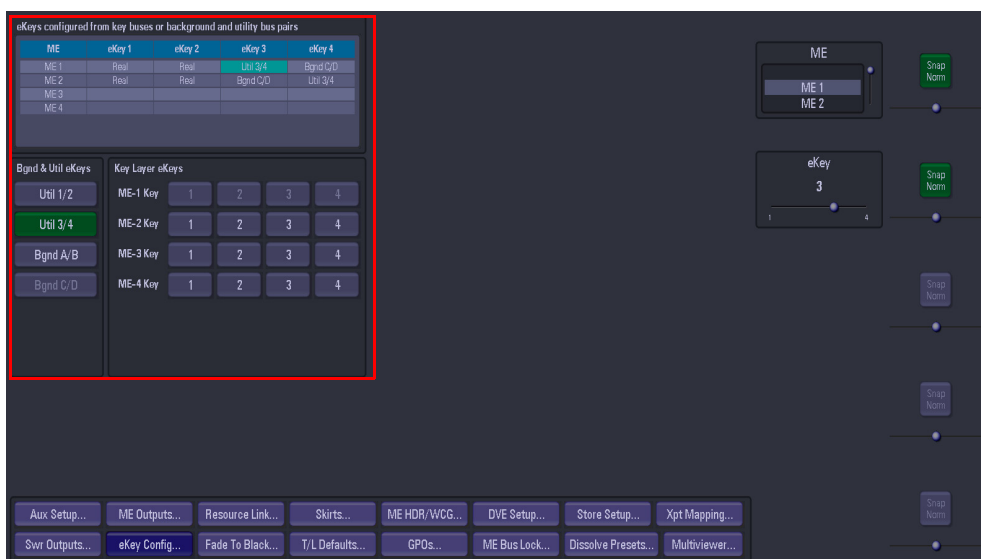
eKey allocation is done on an M/E by M/E basis in the **eKey Config** menu where the user is able to select the type of bus or M/E Key Bus where the eKeys will receive their sources from.
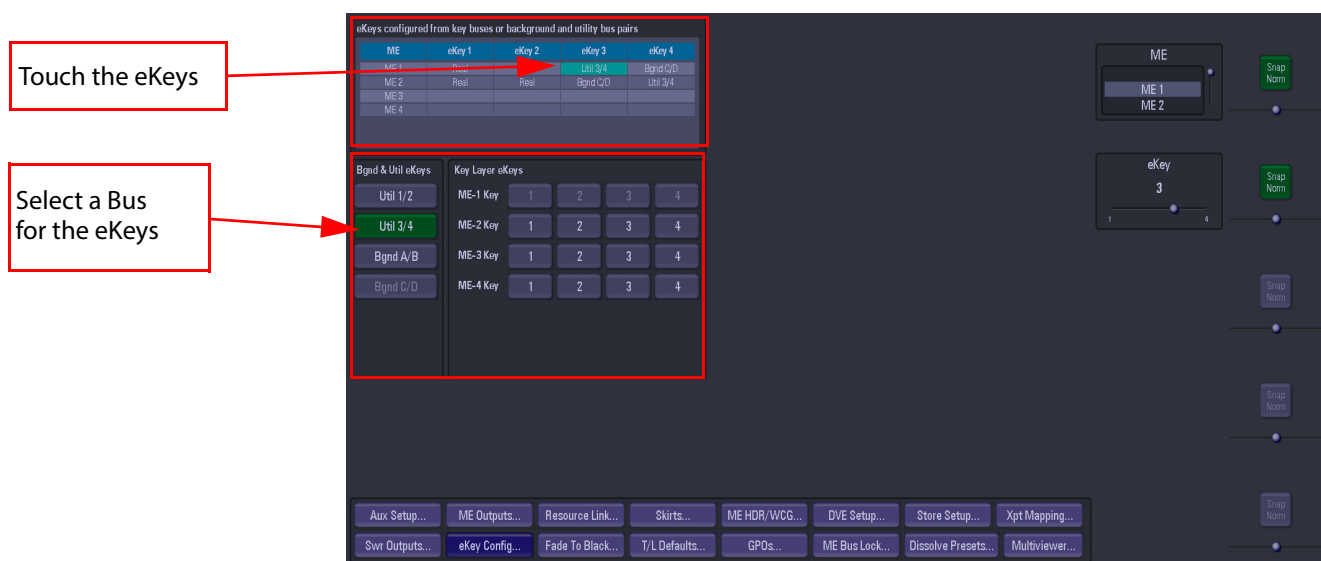
eKey Allocation

This is done by selecting the eKey in the required M/E in the eKey configuration matrix shown in the diagram above (when touched the selected eKey will turn Blue). This can also be done using the parameter controls.
Then in the **Bgnd & Util eKeys** column select the Bus that will be used to supply the source for the eKey.
The selected bus is displayed in the matrix under the selected eKey. The selected Bus button will turn Green.
The user also has the option of selecting an available Key from the **Key Layer eKeys** area of the menu. Selecting the M/E Key is done in exactly the same way as selecting the Bus based source. The selected M/E Key will turn Green when selected.

Note: If the Bgnd& Util eKeys or Key Layer eKeys is grayed out, it means that the resource is being used elsewhere.

Selecting eKeys 1, 2, 3 and 4 on the Control Surface

There is an optional MAV-DSK module for Kahuna Maverik. When the eKeys have been setup as described on the previous page, eKeys can be selected using the MAV-DSK module.

eKey selection buttons

eKey CUT and AUTO buttons
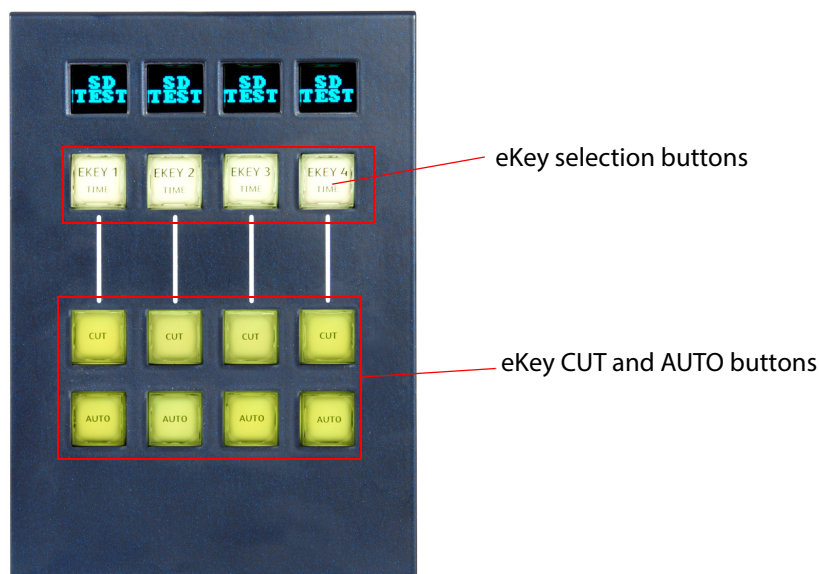
Using the GUI Delegate buttons to access Key's 1 to 4 and eKeys 1 to 4

The Delegate buttons on the GUI allow the user to select which Key(s)/eKeys the current GUI menu is controlling.

As with the control surface buttons, the Key delegate buttons on the soft MLC GUI toggle between the Key represented on the button and eKeys. When an eKey is selected the button will appear green.
eKeys can also be selected on the MAV-KEY-CONTROL module (shown below). Press and hold the [EKEY] button then select an eKey using the [KEY 1] to [KEY 4] buttons. Notice also that when an eKey is selected, the eKey setup menu appears allowing the user to change the settings and parameters of the selected eKey.

Press and hold
[EKEY] button,
then select eKey

Once the eKey configuration has been setup, the eKey Keyer menu can be accessed by pressing the **[KEYER]** button on the GUI. Then touch an {eKEY} button to select the required eKey. The menu will change to reflect the selected eKey on the GUI.

Buttons used to
select an eKey

Note: Notice the square button between the On/Off buttons. If it is tallied
Red it is contributing to a programme output.

Resource Linking

This allows the user to Link Buses or M/Es, allowing Buses or M/Es to become "Slaves" of other Buses or M/Es, e.g. M/E4 Key1 crosspoint selection will be mimicked on Aux1.

In the User Config main menu, press the {Resource Linking…} menu button.

Bus Linking
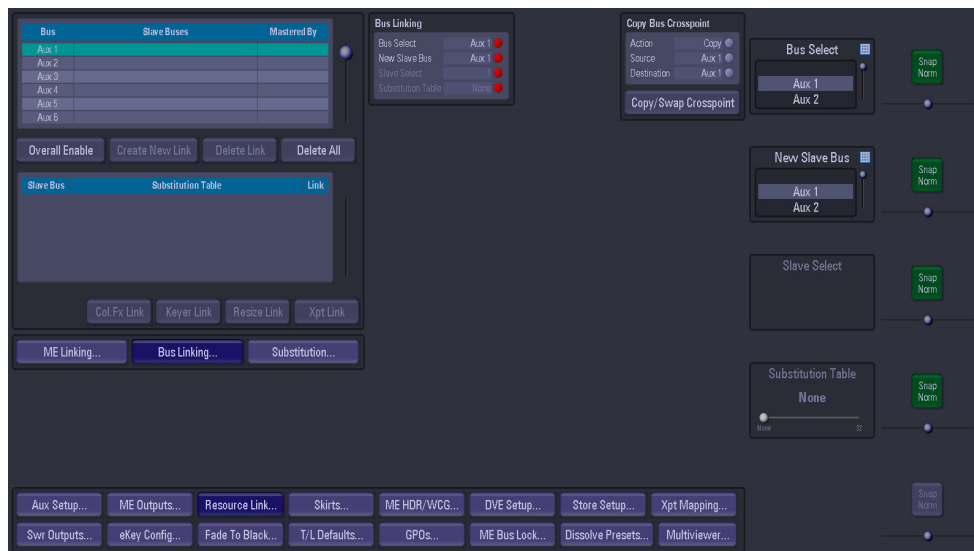
Parameter Controls

Bus Select - selects the Master Bus

New Slave Bus - selects the Slave Bus

Slave Select - selects the Slave Link

Substitution Table - assigns Links to a table (1 to 32 available) the selected table is where the Master Slave bus link will be saved

Link Enable - enables/disables the master /slave link

Overall Enable - turns the bus linking option On/Off

Create New Link - creates a new master/slave link

Delete Link - deletes the selected bus link

Delete All - deletes all master/slave links that have been created

Substitution Tables

Substitutions allow the user to substitute a crosspoint for example; select xpt 1 on Master M/E which in turn selects the substitute Xpt on the slave M/E.
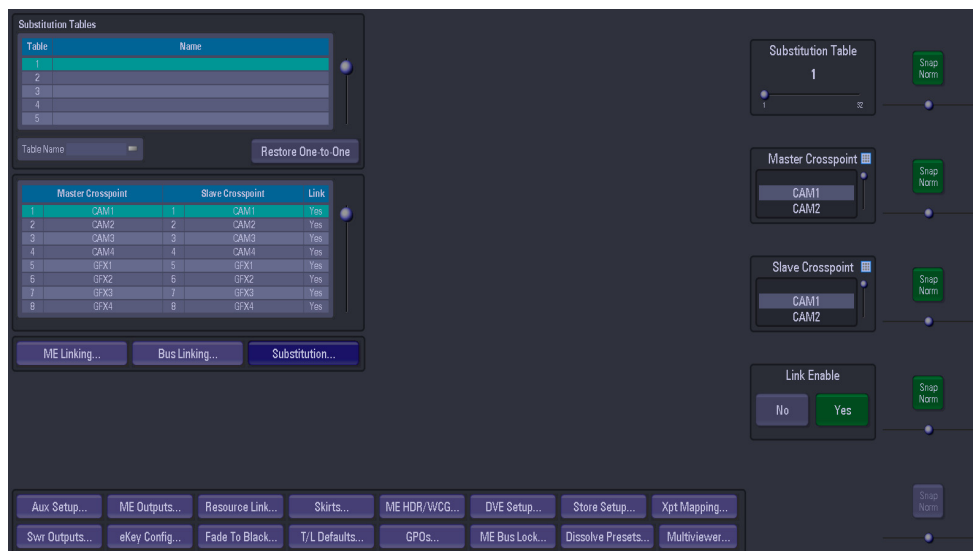
Master/Slave Crosspoint - selects the master/slave crosspoint link, as the crosspoint mapping is setup, the mapping will be automatically saved into the substitution table

Link Enable - enables/disables individual crosspoint mapping links

Restore One-to-One - restores all crosspoint mapping links to their original state (in the selected substitution table only).

Using Bus Linking

To create a Bus Link select the Bus that will become the Master using the Bus Select parameter control, then select the Slaves to this bus using the New Slave Bus parameter, then press **{Create New Link}**.

There are no limits to the number of Slave Buses that can be linked to the Master bus. To delete a Link, select the Link using Slave Select parameter, or touch the entry in the Table, and then press **{Delete Link}**.
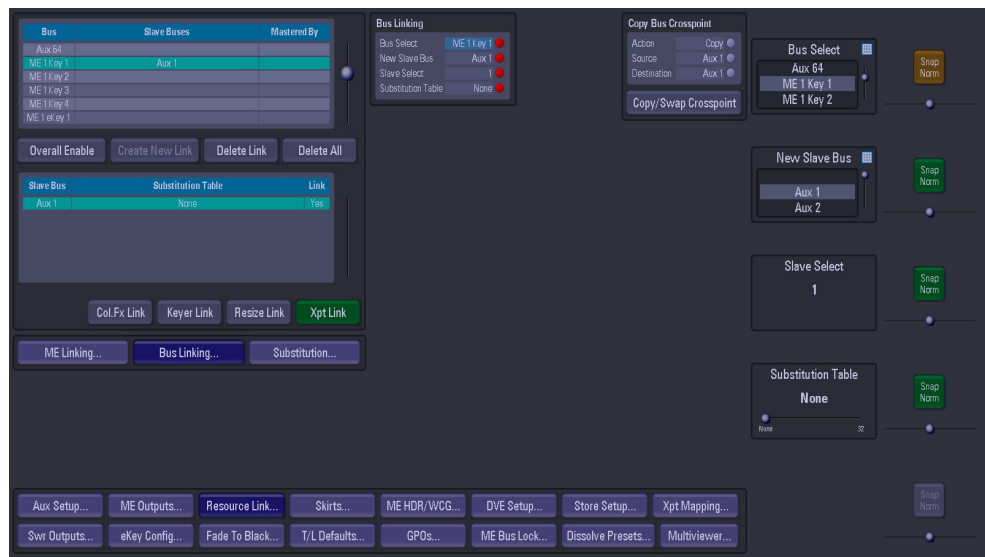
By default the links are 1-1 links e.g. Xpt1 on the Master will select Xpt1on the Slave, although the bus linking can be further enhanced by use of substitution tables, where new crosspoint links can be created.
A **Substitution Table** can be generated where there is no link for some crosspoints (e.g. selecting a crosspoint on the Master Bus will not select a crosspoint on the Slave Buses), a single Substitution Table can be used multiple times.

> Note: There is an Overall Enable to turn the use of Bus linking On/Off, along with independent Link Enables

> Note: The **[UNDO]** button on the GUI will restore the Link. By default the Substitution Table selected will be "None" (Substitution Table 0) which is a 1 to 1 crosspoint link.

Creating a Substitution Table

To create a Substitution Table select **{Substitution Tables...}**, then select a table number using the Substitution Tables parameter (this menu allows up to 32 substitution tables to be generated). The table can then be given a name in the **Table Name** attacher.
Setup the crosspoint mapping as required, using the Master Crosspoint and Slave Crosspoint parameters.
The crosspoint set-up is displayed in the table below the Substitution Table, this includes any link that may need to be disabled. As the crosspoint mapping is setup, this will be automatically saved in the table.
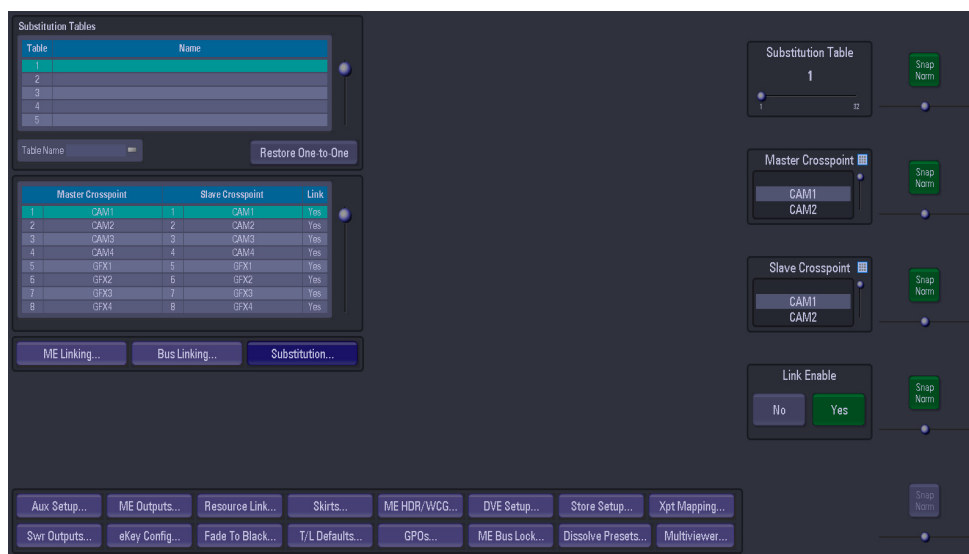
The Substitution Tables and crosspoint assignments are saved in the User Config File, in the File System that has a separate Enable for Bus Linking.

M/E Linking

M/E Linking works in a very similar way to Bus Linking, where M/Es become "Slaves" of other Buses or M/Es
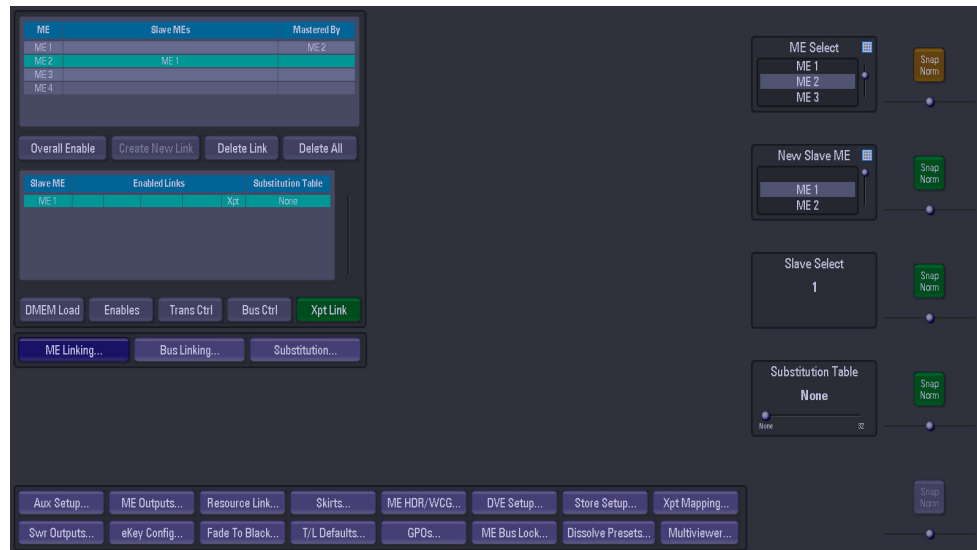
Parameter Controls

ME Select - selects the M/E

New Slave ME - selects the Slave M/E

Slave Select - selects the Slave Link

Substitution Table - assigns Links to a table (1 to 32 available) the selected table is where the Master Slave bus link will be saved

Link Enable - enables/disables the master /slave link

Overall Enable - turns the M/E linking option On/Off

Create New Link - creates a new master/slave link

Delete Link - deletes the selected bus link

Delete All - deletes all master/slave links that have been created

Fade To Black

In the **User Config** menu is the **Fade To Black** (FTB) option, which allows the adjustment and control of the Fade To Black function.

Press the **{Fade To Black…}** menu link button.
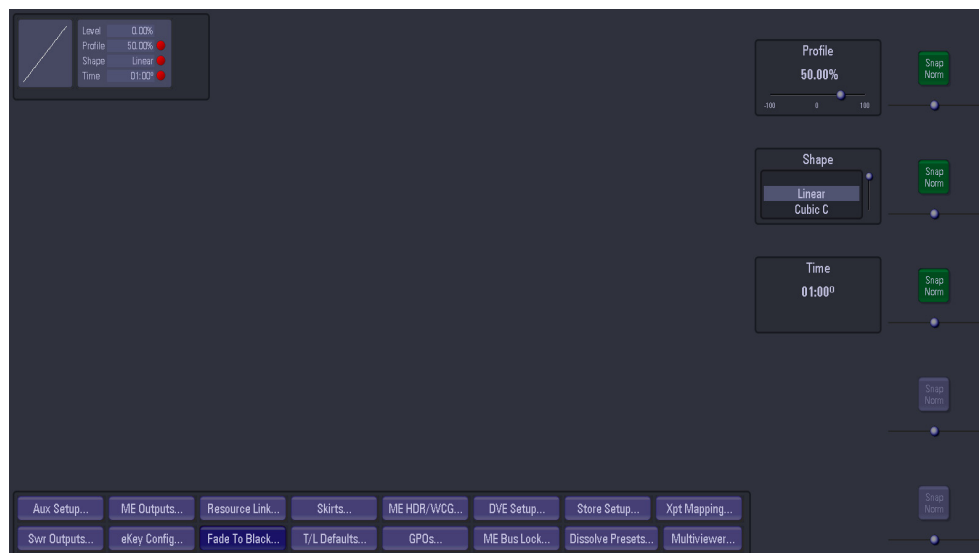
The above parameter controls alter the FTB profile and transition timing.

Profile - The Profile parameter control will adjust the FTB transition curve profile, changing the curve profile will make the transition accelerate or decelerate at a specific moment in the FTB transition period. The curve profile can only be used to change the Cubic S/Sin S and Cubic Curve/Sin Curve profiles, which are selected using the Shape parameter control. The Linear profile cannot be adjusted.

Shape - Selecting one of the Shape options will depict the type of profile curve, this will alter the acceleration rate for a FTB transition.

- **Linear** - constant transition, no change in transition acceleration
- **Cubic C and Sin C** - these profiles are similar to each other, the default transition will have a fast acceleration at the start and slowdown towards the end.
- **Cubic Curve and Sin Curve** - these profiles are also similar to each other, the default transition will accelerate at the start slow down towards the mid point and accelerate again.

Time - this parameter alters the amount of time that it takes for the FTB to transition. The parameter adjusts the minutes/seconds, frames and fields.

Fade To Black - Using the MAV-JOY

Fade To Black can also be controlled using the joystick **[FADE TO BLACK]** button.

Press the **[FADE TO BLACK]** button and the button will turn Green, which means that Fade To Black is ready to transition.

Press the **[RUN]** button to run a timed Fade To Black transition, the transition time can be setup in the **User Config - Fade To Black** menu, adjusting the Time parameter will set the transition time. While the transition is taking place, the **[RUN]** button will turn White and the **[FADE TO BLACK]** button will flash White/Green/White/Green to display that Fade To Black is active. Press the **[RUN]** button once more and the system will transition back to the source signal, and the **[FADE TO BLACK]** button will turn Green.

Press the white **[FADE TO BLACK]** button to cancel the FTB option.

Skirts

There are two types of "**Skirts**" available in Kahuna, this section will describe the first which are skirts, they are displayed on the **M/E Background Bus**, this feature will display "**Side Skirts**". If the mainframe system standard is set to 1080i/59.94 for example and the mainframe receives an SD 4:3 source on its input, with the **Use Default Std** parameter is set to **No**, if the source is selected on a crosspoint (M/E background Bus) the source will be displayed in a 16:9 space like the image shown below.

The pictures shows the original 4:3 source, and because it is displayed in a 16:9 space now has "**Side Skirts**". The side skirts can be filled using the **Skirt Setup** menu in the **User Config** menu as explained on the next page.

In the **Skirt Setup** menu press the **{ME Background Skirts}** button. This menu allows the user to setup the side skirt fill sources for the background bus for each of the M/Es in the mainframe

Using the **ME Selector** parameter, select the M/E which has the 4:3 source and then select how the side skirts are going to be filled, i.e. using a Matte or a Utility Bus from the **Skirt Fill** parameter.

If Matte is selected, use the Matte Selector parameter to select a color from the list or create a color using the **Local Matte** parameters. If **Matte (U1- U2)** is selected, a fill source can be selected using the crosspoints on the Utility Bus.

With Matte Side Skirts

With Utility Bus Side Skirts

Note:	The selected Side Skirt fill will be applied to all 4:3 sources on the selected M/E

Output Skirts

This is the second method of applying Skirts, they are applied to a switcher output, where "Side Skirts" are added to 4:3 sources on a 16:9 output and top/bottom skirts are added to 16:9 sources on a 4:3 output when set to "**Letterbox**" mode.

If a 4:3 source is applied to a 16:9 output, then side skirts will be applied, the side skirts can be filled by entering the **User Config - Skirt Setup** menu.

Use the **Switcher Output** parameter to select the output, then use the **Matte Selector** to select the fill for the side skirts.

To setup **letterbox mode**, an output from the mainframe has to have its video standard changed to 4:3 in the **Eng Config - Output Setup - Output Standard** menu.
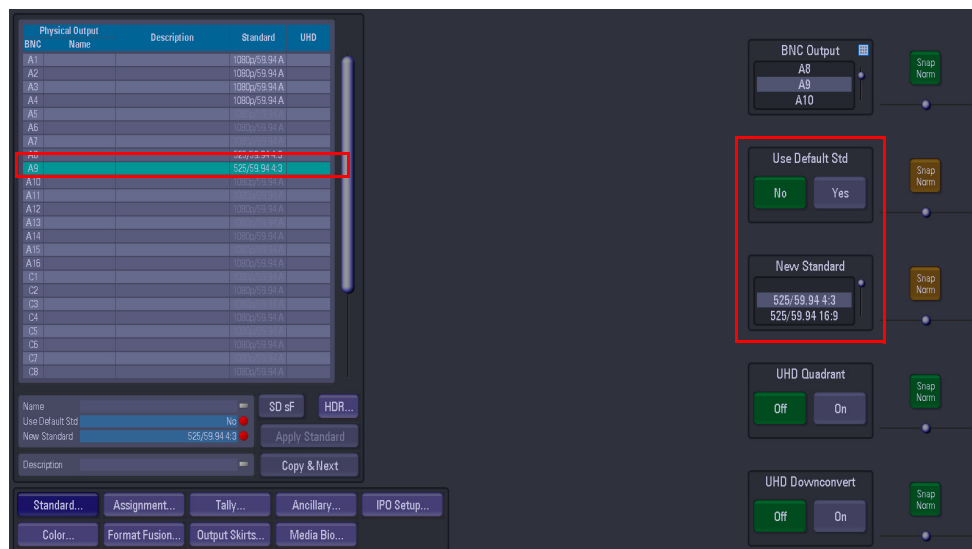
This will allow the user to turn On the **4:3 Letterbox** function in the **Output Skirts** menu.

Note: Once 4:3 Letterbox has been turned On, the video standard in the **Output Standard** menu (above) the video standard in the table will show for example 625/50 4:3 LB (LB = Letterbox)
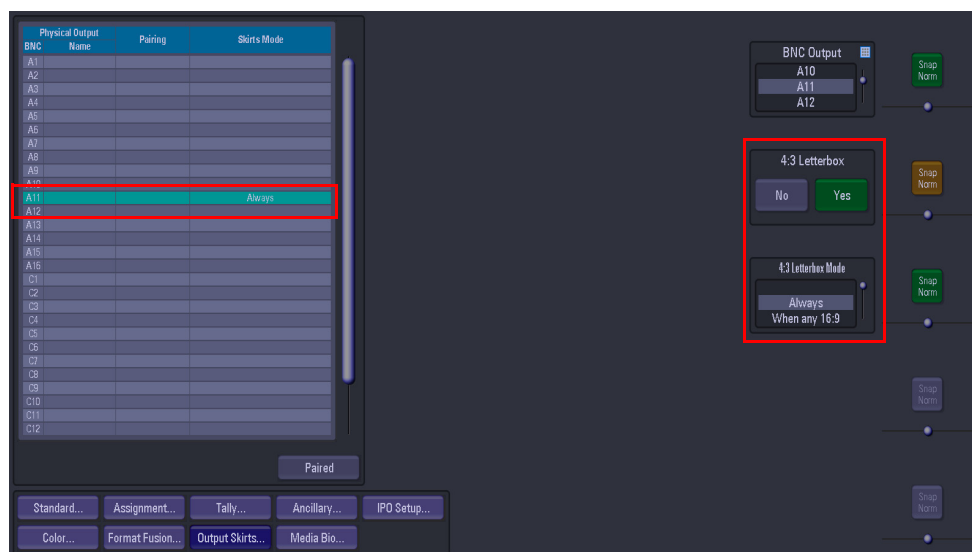
With the letterbox mode setup, now go to the **User Config - Skirt Setup** menu where the letterbox skirts can be setup.

Once 4:3 letterbox has been turned the output will look like the diagram below.

The diagram shows a 16:9 source displayed on a 4:3 output. The fill for the top and bottom skirts, as mentioned earlier, is setup in the **User Config - Skirt Setup** menu, in the default state only a Matte fill can be selected.

Go back to the **Eng Config - Output Setup - Output Skirts** menu, the user now has several modes that can be selected.

Using the 4:3 Letterbox Mode parameter, letterbox can be set to:-

- **Always** - all sources will be placed into a 16:9 letterbox; when 4:3 sources are selected, they will get both top/bottom skirts and side skirts.
- **When any 16:9** - if the source is 4:3 or the M/E output feeding the switcher output has any 16:9 content on its background, it will be placed into a 16:9 letterbox.
- **When all 16:9** - if the source is 16:9 or the M/E output feeding the switcher output has any 16:9 content on its background, it will be placed into a 16:9 letterbox.
- **Persist** - switches to show a letterbox 16:9 or full frame 4:3 and only changes once its source is completely the opposite format to the one it is currently showing.
- **Auto Zoom** - Will show 16:9 as a letterbox, 4:3 as full frame, and an ME output will be resized according to the proportions of 4:3 and 16:9 sources that make up its background.

As mentioned earlier, the fill for output skirts is by default a Matte, but physical outputs can also be paired together using the **{Paired}** button (shown above), which will allow the output skirts top and bottom to be filled with any source Video, Still, Wash, DVE output or ME output. Output skirts Matte or fill sources can be set independently for each output. Both of the paired outputs will have the same source on them but the audio for the second output will come from the side skirt audio.

If a 4:3 input source is selected on an output that is set to a 4:3 standard, the output will have letterbox skirts and side skirts as shown below.

4:3 source on a 4:3 output Matte side skirts with Store letterbox skirts

When a 4:3 source is on a 4:3 output use the ME Background Skirts parameters to alter the side skirts, and Output Skirts parameters to alter the letterbox skirts.

TL Defaults (Timeline Defaults)

In the Timeline Defaults menu the user is able to set up default values used by the system when creating timelines, they should be set before creating a timeline.
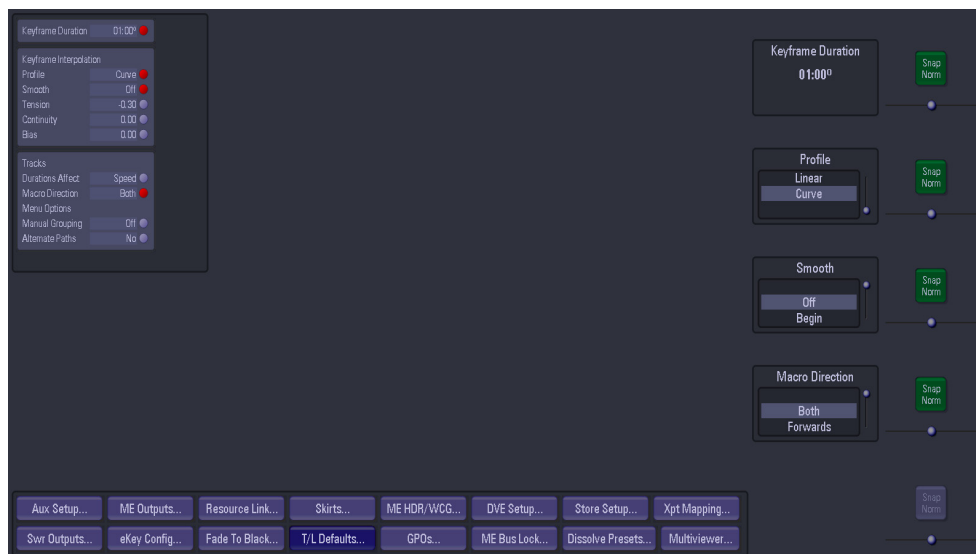
The Timeline Default Values that can be set are:

Keyframe Duration - This value is the default keyframe duration used by the system. A keyframe will be given this default duration when it is inserted at the end of a timeline or when inserted anywhere within the existing active area.
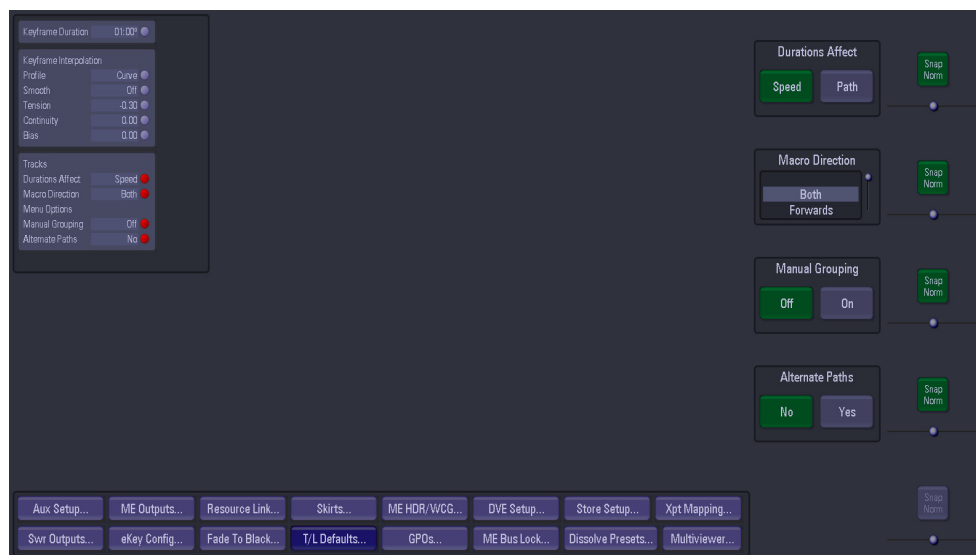
Keyframe Interpolation

Profile/Smooth/Tension/Continuity/Bias - These are the default movement setting applied to a new keyframe when it is inserted in the timeline. These values are only relevant when the parameter being timelined can have movement settings applied to it.

Macro Direction - This value is the default direction setting that is applied to any macro keyframes inserted into a timeline.

Manual Grouping - This setting allows or disallows the user to manually create groups from parameters that are currently in the timeline. When this option is switched on the group button becomes activated in the Parameter Level menus when in edit enable mode.

Alternate Paths - Controls whether the 'Path' toggle button appears in the 'track edit' level in the timeline menu. This 'path' button will toggle a setting on the highlighted track which will be shown by a label to the right of the track name. This label reads "Durations Affect Curved Paths".

ME HDR/WCG

The 'Per ME HDR/WCG' menus allows specific/individual M/Es to run in a different or individual HDR or Wide Color Gamut (WCG) standards to the rest of the Kahuna system.
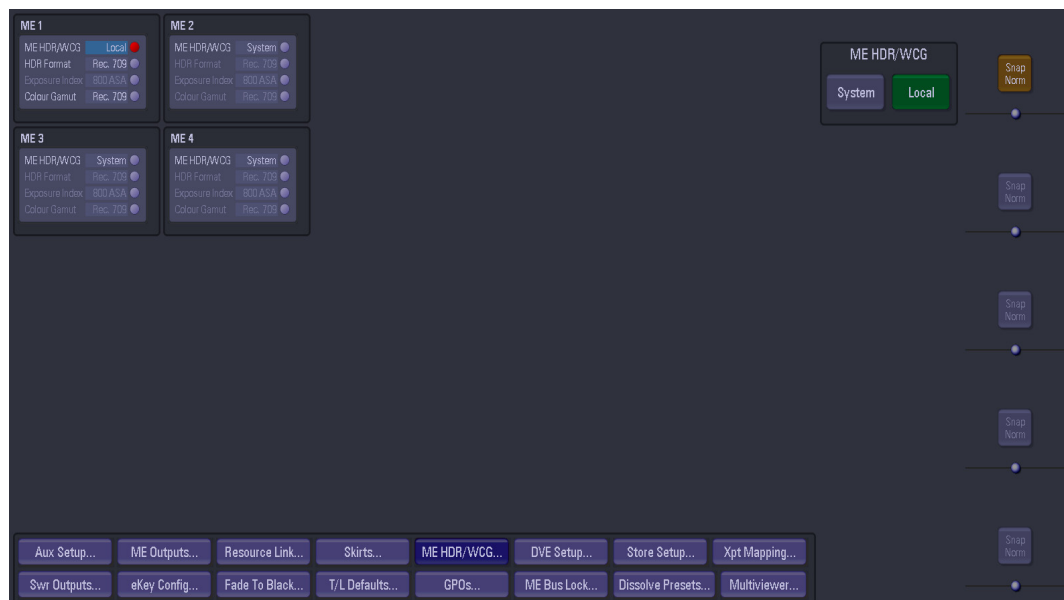
If a M/E's HDR/WCG setting is 'System' it will be in the main system HDR/WCG standard, however if an M/E's HDR/WCG setting is 'Local' it will be working in the HDR/WCG standard specified in this menu.

This is useful for a single Kahuna mainframe to generate versions of the same program in different HDR/SDR formats with minimal signal conversions (at the cost of using up more M/Es).

For example: in an HDR system* to generate an SDR (i.e. Rec. 709) feed, a M/E could be set to 'Local' and 'Rec. 709'. Then any SDR sources to this M/E will NOT be converted to HDR and any HDR sources will be converted to SDR (Rec. 709). If this M/E is changed to an SDR output, then those SDR sources will be transparently passed through.

This is better than simply 'down converting' the system output where SDR inputs would otherwise have been 'up converted' to HDR and then 'down converted' back to SDR.

* Eng Config - System Standard - HDR Format is anything except SDR.

> Note: SDR is referred to as 'Rec. 709'.

GPO Setup

This GPO Setup menu is used to tally Crosspoint based, Bus based and User BIT functions. The default setup state allows the user to tally GPO's 121 to 256 which are the physical and internal GPO's and are comprised of:

GPO 121 to GPO 132 and GPO 133 to GPO 144 are the physical Ref Fin GPO's, again at the rear of the mainframe. These GPO's are system setup dependant; GPO 121 to GPO 132 Ref Fin A, GPO 133 to GPO 144 Ref Fin B.

GPO 145 to GPO 256 are Internal GPO's (but the configuration could be GPO 133 to GPO 256 if only 1 Ref Fin is fitted).

The Internal GPO's are used to trigger internal function such as Macro's, Timelines or any internal function that can be switched On or Off.
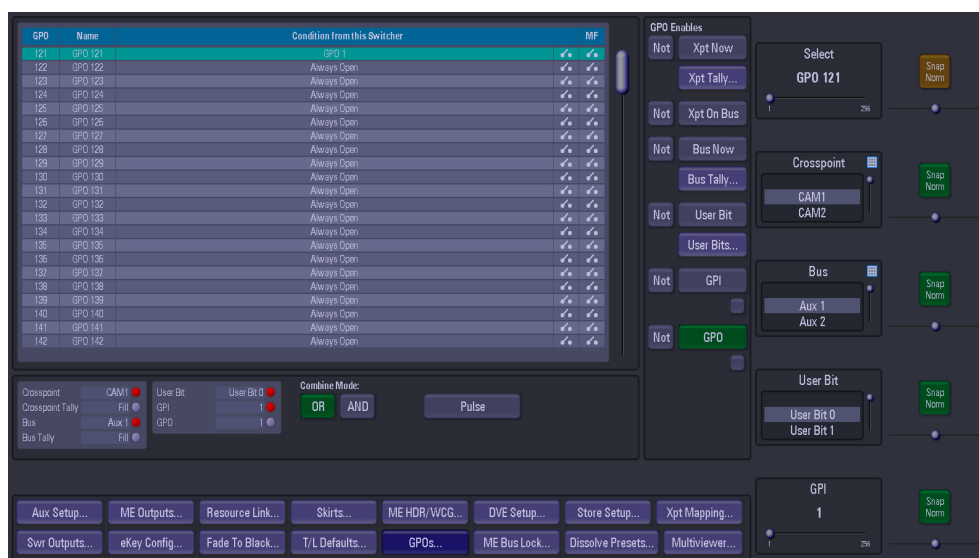
This menu allows the user to trigger a GPO or GPI when for example a crosspoint is setup to trigger a GPO, or an Aux is setup to trigger a Bus tally.

Touch the attacher below the GPO table and the parameters will change allowing the user to setup a GPO trigger.
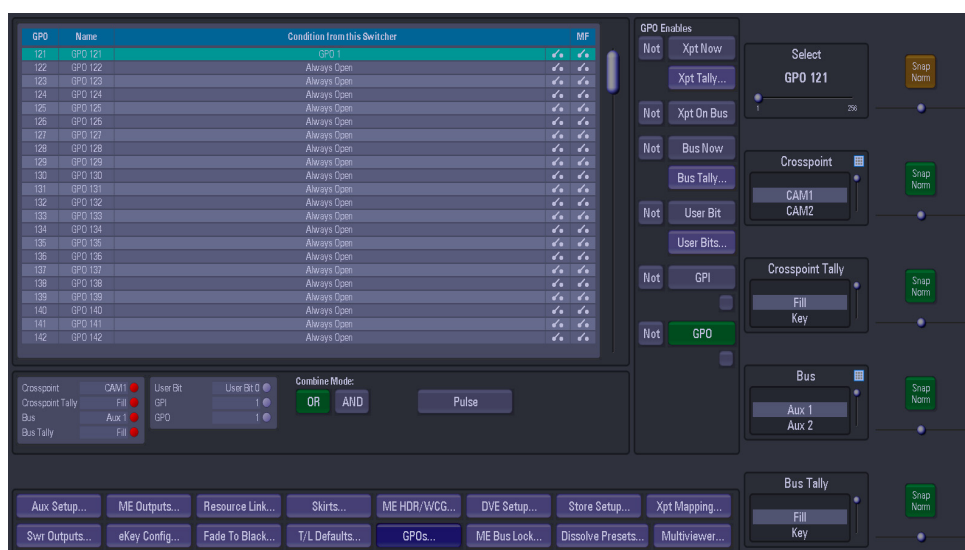
For a crosspoint tally for example, use the **GPO Select** parameter to the required GPO, use the **Crosspoint** parameter to select the crosspoint that will trigger the GPO, and then select the **Crosspoint Tally**. In the **GPO Enables** button area of the menu, press the **{GPO}** button and each crosspoint trigger will only trigger a GPO, or touch the **{Xpt Now}** button, then when the selected crosspoint button (as shown in the menu above) is pressed the GPO will be triggered.

> Note: Touch the popup selector (blue square) in the Crosspoint parameter and a greater selection of GPO trigger options will be displayed.

Crosspoint and Bus Options

When selecting the type of GPO or GPI trigger, as mentioned previously, press the popup attacher to easily access the other Crosspoint or Bus options.
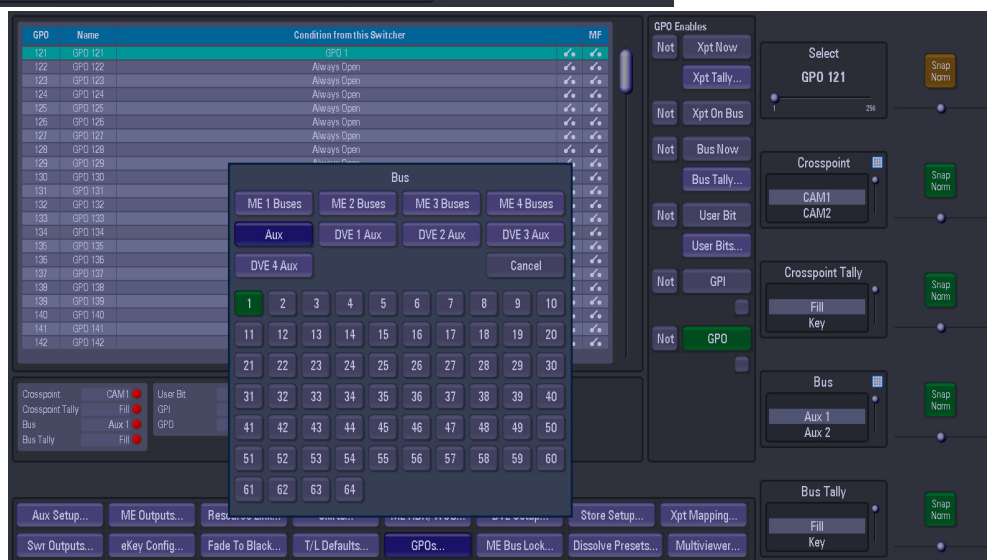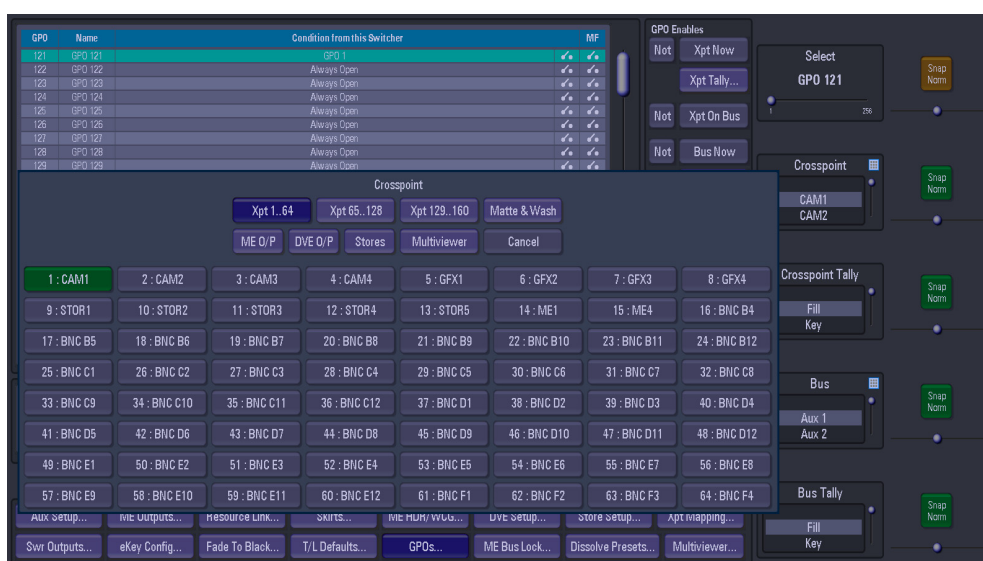
DVE Setup

The Tile Allocation table displays the DVEs that have been allocated to the switcher, in the diagram below all 4 DVEs have been allocated to this logical switcher. The table also displays the number of tiles allocated to each DVE.

Displays DVEs and Tiles allocated to the DVEs

The number of tiles allocated to a single DVE will dictate the number of DVE models that can be used with that DVE. Some DVE models will require 2 tiles, others will require 3, so it is important to know how many tiles to allocate.

To allocate tiles to DVEs, use the **DVE** parameter to select a DVE, and then use the **Allocated Tiles** parameter to set the number of tiles. As the Allocated Tiles parameter is adjusted notice that the **{Apply Changes}** button turns orange, press the **{Apply Changes}** button and the tiles are allocated.

The **Tile Allocation** table displays:

DVE - The number of DVEs in a Logical Switcher

In Use - The number of Tiles being currently used by a DVE model

Allocated - The number of Tiles allocated to the DVE

New - Displays how many tiles are going to be allocated to the DVE

The **Unused Tiles** box displays the number of tiles that are free to be allocated

ME Bus Lock

This function is basically a crosspoint lock. If one of the selected Key, Util or Bgnd is selected and set to lock, the crosspoint buttons cannot be selected.

This would be used if a specific bus has to be locked out so it cannot be selected during a live production.
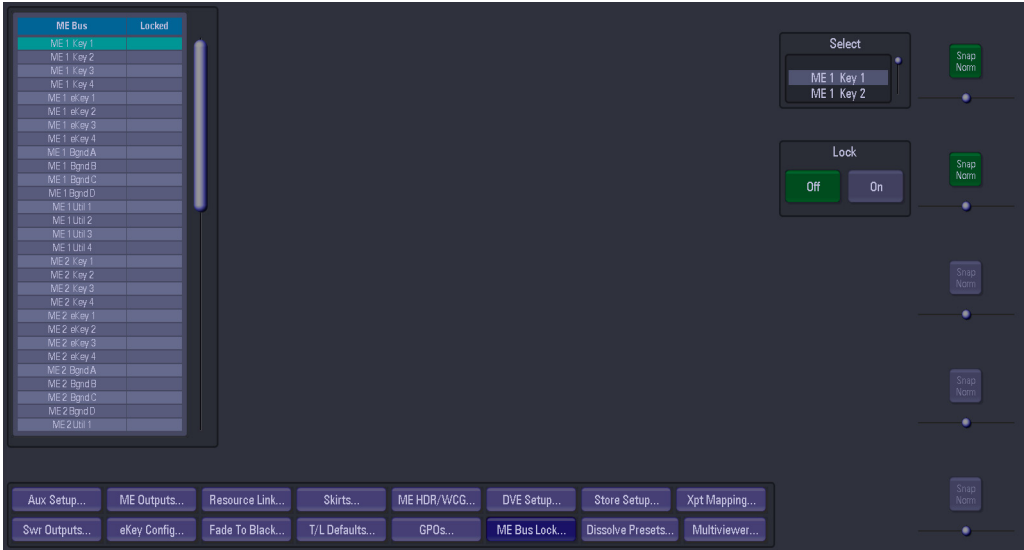
Store Setup

The Store Setup menu allows the user to setup the way the stores are coupled when using a clip, the allocation of time to each store can also be setup in this menu and the stores can also be given names.
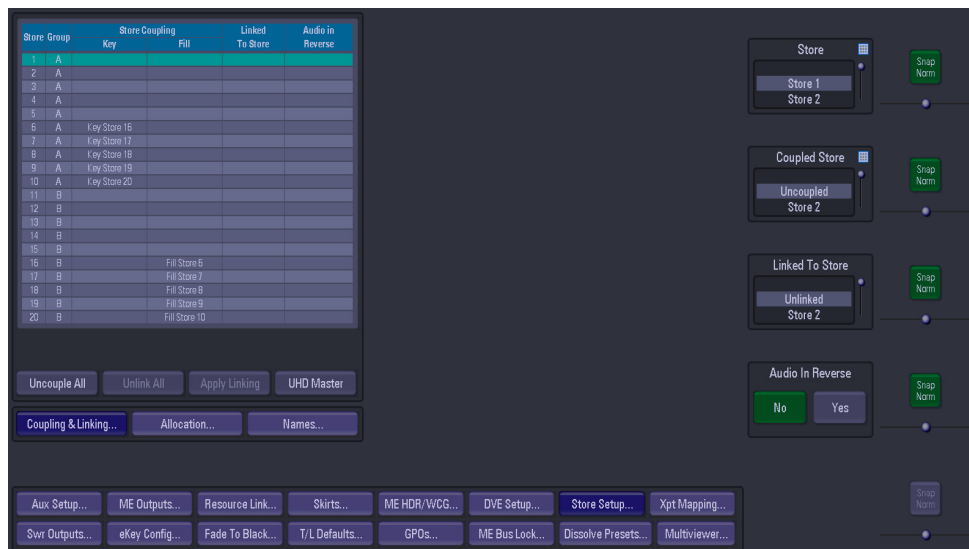
Store Coupling & Linking

The **Coupling & Linking** menu allows the user to setup stores which contain video clips or "Bugs" which are for example Keyed over a background where the Key source can be made to be transparent.

To do this the clip has to have a Key and Fill source coupled together over 2 stores, this is done in the **Store Coupling & Linking** menu.

In the table from left to right; the Store column lists the available stores. The number of stores that are available to use depends on the number of control cards fitted in the mainframe. In the table above, Stores 1 - 10 can be seen, if a second card is fitted there would be 20 stores shown in this column.
Group A column, also relates to the single control card fitted and the 10 available stores. If a second control card is fitted, the table would display **Group B** and stores 11 - 20.

DVE Store column is a future feature.

Store Coupling - the Key/lighting column is the Key store that is coupled to the Fill store. The Fill/Effects column is the Fill store that is coupled to the Key store.
For example, in the table above, Store 1 has a Key that is Key Store 2 coupled to Fill Store 1.

Store Allocation

The Allocation menu allows the user to see the time used by clips loaded into each individual store, adjust the time allocated store by store or set maximum time limits on each store. The amount of overall time that can be allocated to a single store or to all stores depends on the amount of Clipstore memory purchased.
Up to 64Gb of Clipstore memory can be purchased for the Kahuna Stores (32Gb per Control Card). A system with 64Gb is capable of handling over:

- 40 minutes of SD Video
- 8 minutes of HD Video
- 4 minutes of 1080p Video

The table in the menu above displays all the available stores, if any clips are loaded into them, the clip time duration is displayed in the **Current** column. Selecting a Store and turning **On** the **Maximum** parameter, the user is able set a Maximum Duration of time for each store. So, if for example a time of 2:00;23 is set as a maximum in a store, a clip no larger than 2 minutes and 23 frames can be loaded into the store.

If a selected Store is 5 minutes long or has had 5 minutes Reserved, adjusting the **Allocation Format** parameter changes the amount of memory the store has depending on the option selected, i.e. if the store has 5 minutes of SD memory, then the store will have just over 51 seconds of 1080i store memory when selected.
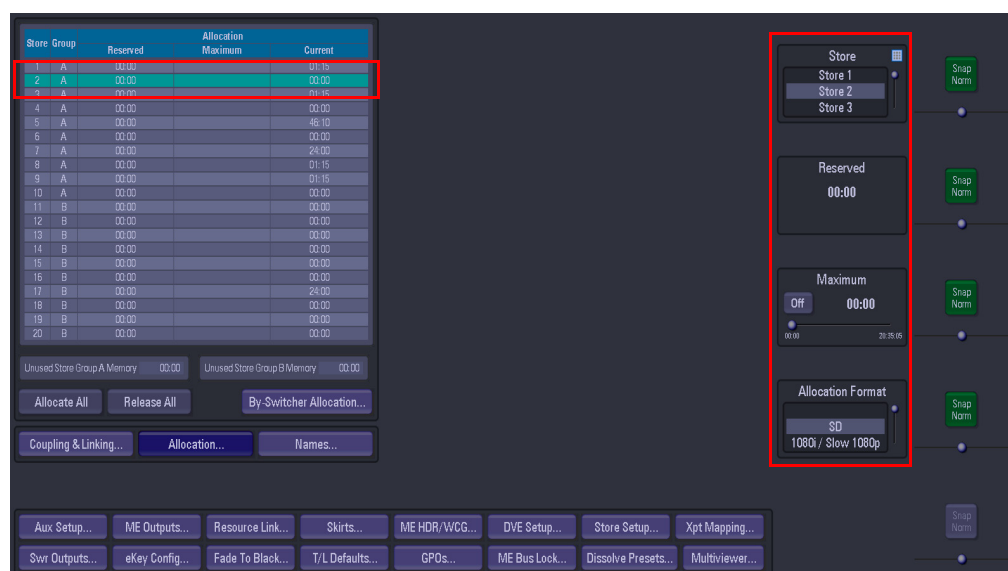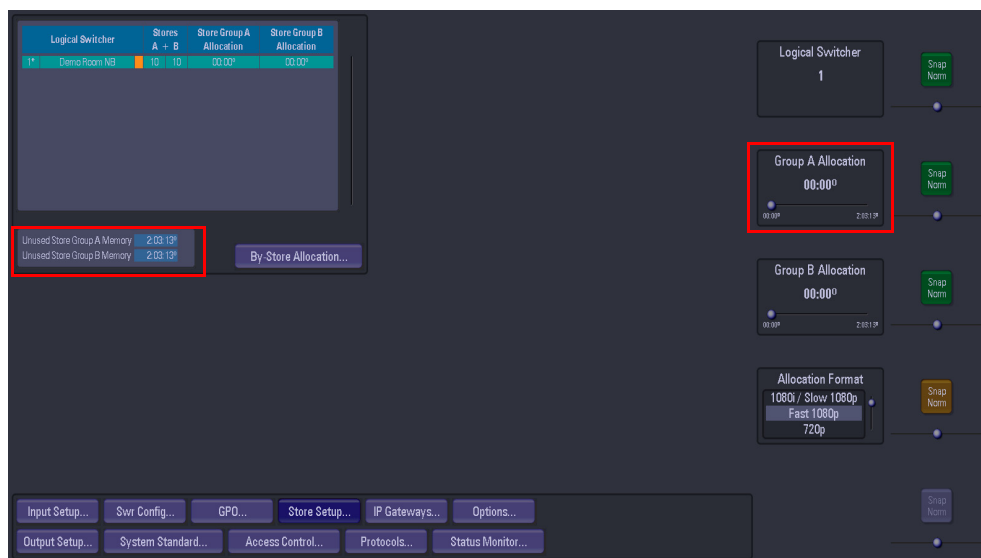
In the **Engineering Config - Store Setup** menu (above left), "chunks" of the overall **Clipstore** memory can be allocated to individual Logical Switchers. The allocated memory can then be allocated to individual stores in the Reserved store memory column in the **User Config Store Memory Allocation** in the above menu (right).

This means that the user is only able to allocate memory to stores that is equal to the total amount of memory allocated in the **Engineering Config - Store Setup** menu i.e. if 10 minutes of memory is allocated to a Logical Switcher, then only 10 minutes of memory time can be allocated to 10 Stores in total.

Store Names

The Names menu allows the user to give a user defined name and description to individual stores.
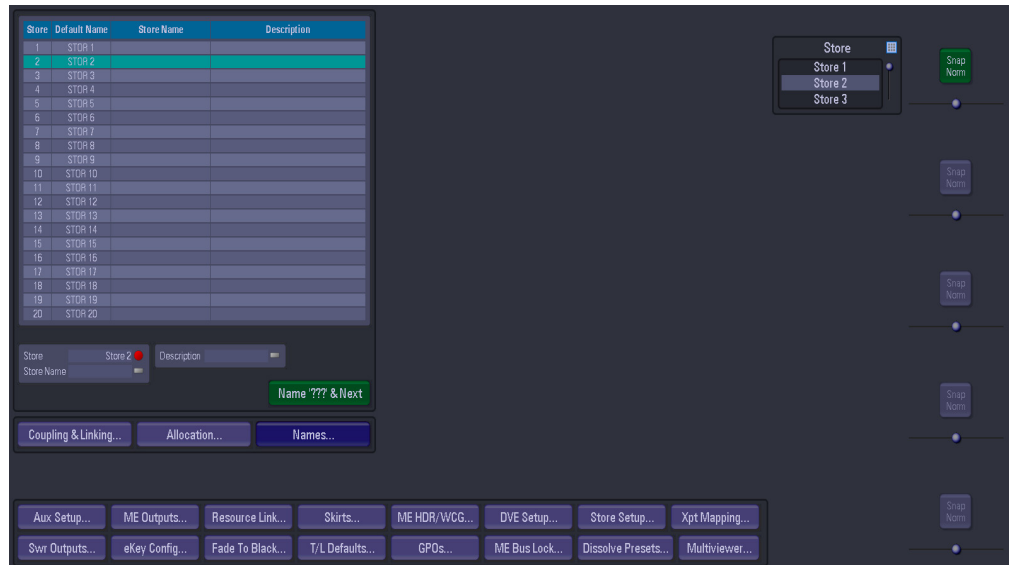
If a Still or Clip that is imported into the Kahuna mainframe already has a file name, pressing the **{Name '???' & Next}** button will copy the name from the file and give it to the selected Store in the **Store Name** column, the selection bar will then automatically move on to the next Store in the table.

Dissolve Presets

The Effects Dissolve Presets, setup in this menu can be used with the "**Effects Dissolve**" functions in the "Short Cuts" menu and in the "**Filing System - DMEM**" menu.
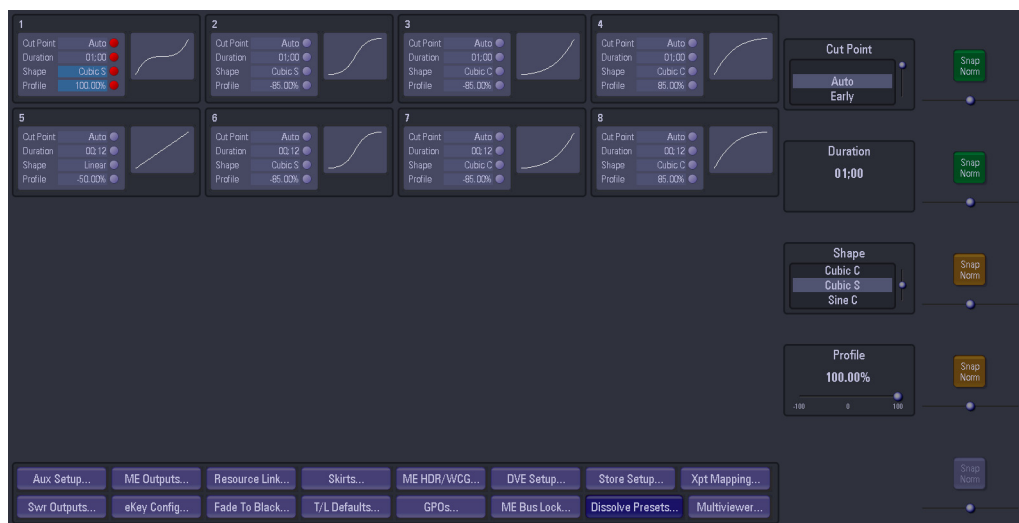
The user can setup 8 different presets that can be recalled into an effects dissolve setup. Use the parameter controls to setup the; Cut Point, Duration, Shape and Profile.
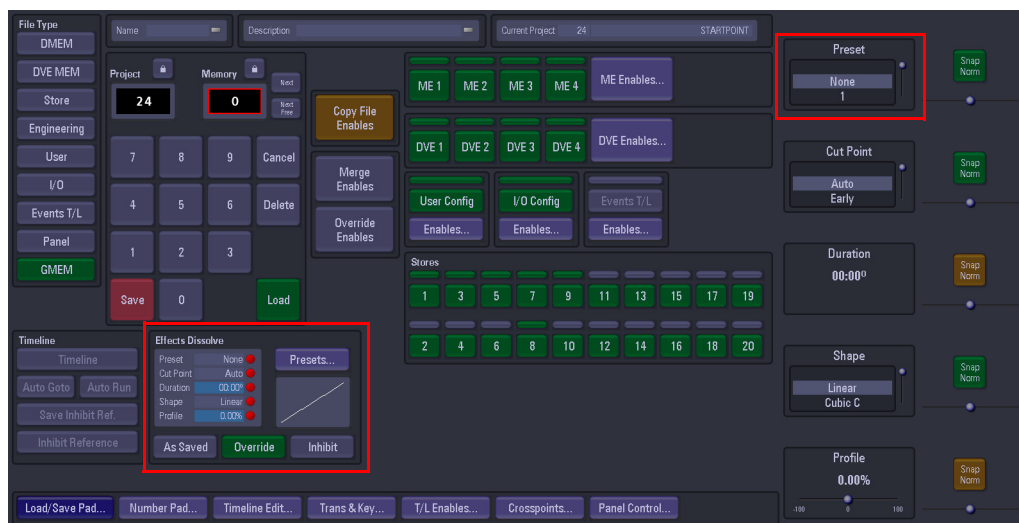
In the "**Shortcuts - Load/Save Pad**" menu, you can touch the **{Presets...}** menu link button to open the presets menu, then use the "**Preset**" parameter to select required preset.
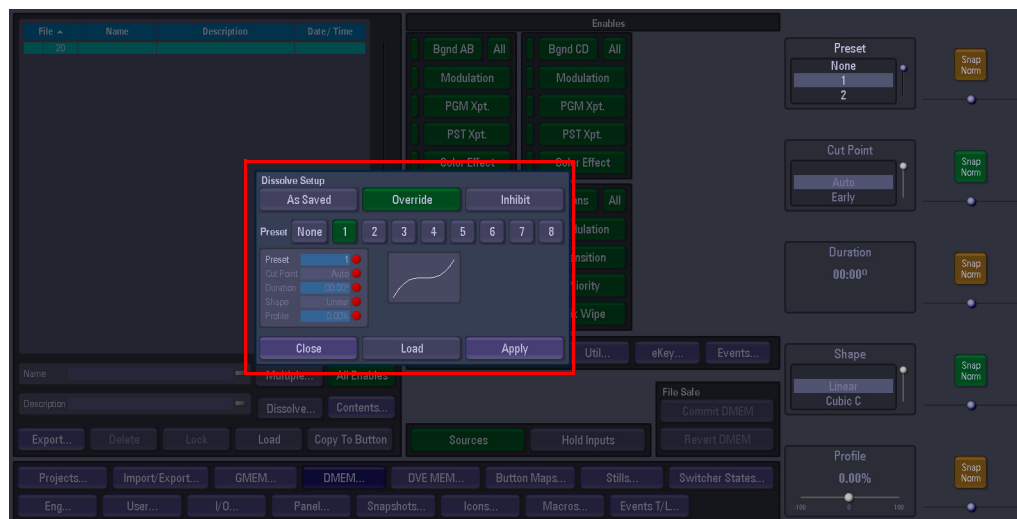
In the "**Filing System - DMEM - Dissolve Setup**" menu, when setting up an effects dissolve with a DMEM file, select one of the 8 presets and touch the **{Apply}** button.

Xpt Mapping

Please see the "**Crosspoint Mapping**" chapter of this manual.

Multiviewer

The format independent multiviewer provides great flexibility with its preset and user-defined layouts, and features the following:

- Up to 8 flexible output heads (Kahuna 9600 with two Router cards)
- Up to 24 windows (Kahuna 9600 with two Router cards)
- All external and internal sources selectable to all heads and all windows
- Instant preset layouts
- Clear and follow-through labeling
- Red and green tallies
- Assign to any output
- Format independent
- Memorize and recall layouts as part of a show setup.

There are 4 Heads per multiviewer, the heads can have up to 12 tiles assigned to 1 head or 12 tiles assigned across the 4 heads which can be used across different outputs or even logical switchers.
Sources are freely assignable to 10 tiles, the remaining 2 tiles are internal sources.

Output from the multiviewer are assigned to outputs from the mainframe like any other output, this is done in the **Use Config - Switcher Output Config** menu, see below.
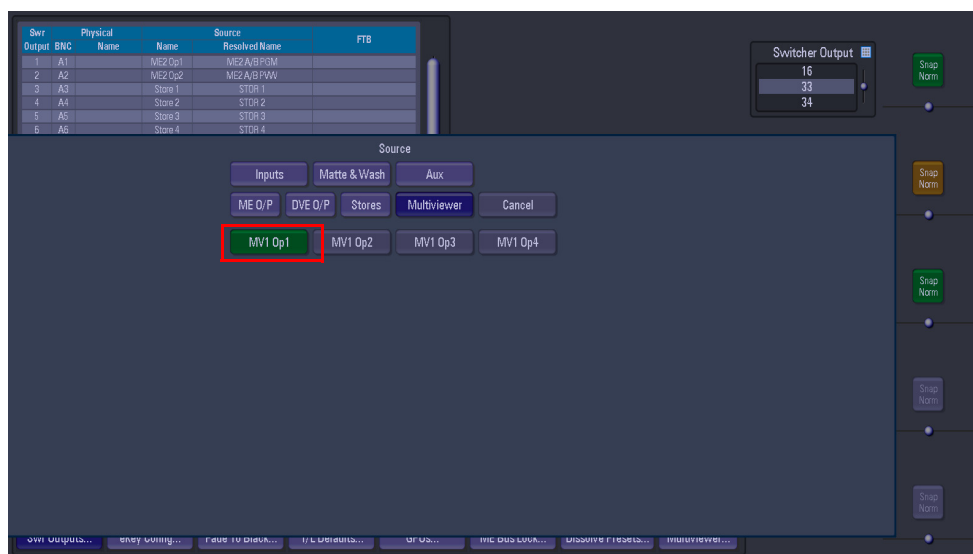
As shown in the menu diagram above, the Output Fin A10 is selected for the multiviewer output, this is done by using the **"Switcher Output"** parameter to select the physical output from the mainframe, then use the **"Source"** parameter to select the multiviewer head or MV Op1 to MV Op4.

Multiviewer Setup

Once the multiviewer output has been assigned, the next step is to assign tiles to the multiviewer heads.
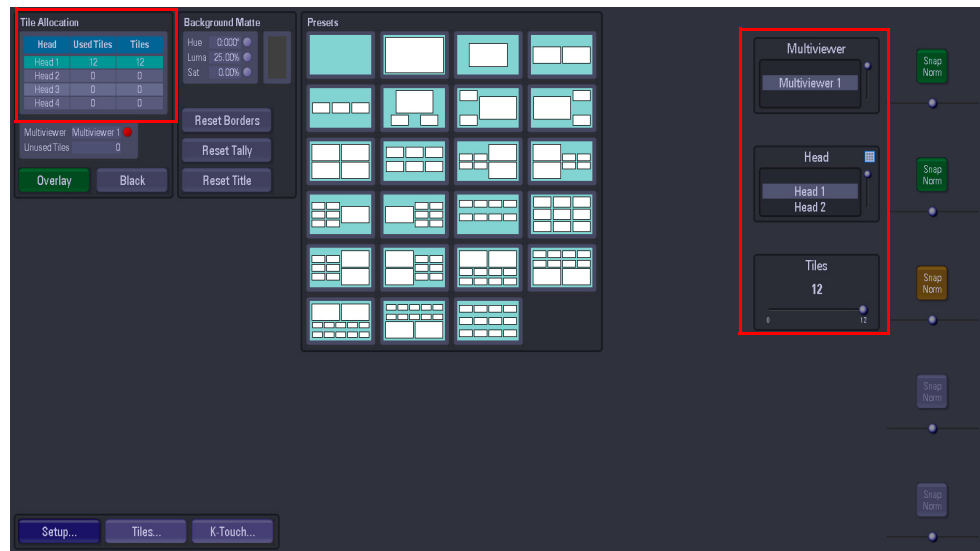
As can be seen in the diagram above, the parameter controls are used to select the required multiviewer head, then use the "Tiles" parameter to assign tiles to the head. The number of tiles assigned to a head is important because it will restrict the number of preset tile layouts and user defined multiviewer layouts that can be used.
The number of unused tile is displayed in the "**Unused Tile**" parameter
Overlay On/Off - will turn off the borders around all tiles and background behind the multiviewer tiles.

The background color behind the multiviewer tiles can be set by the user, touch the "Background Matte" parameter and use the parameter control to set the required color.
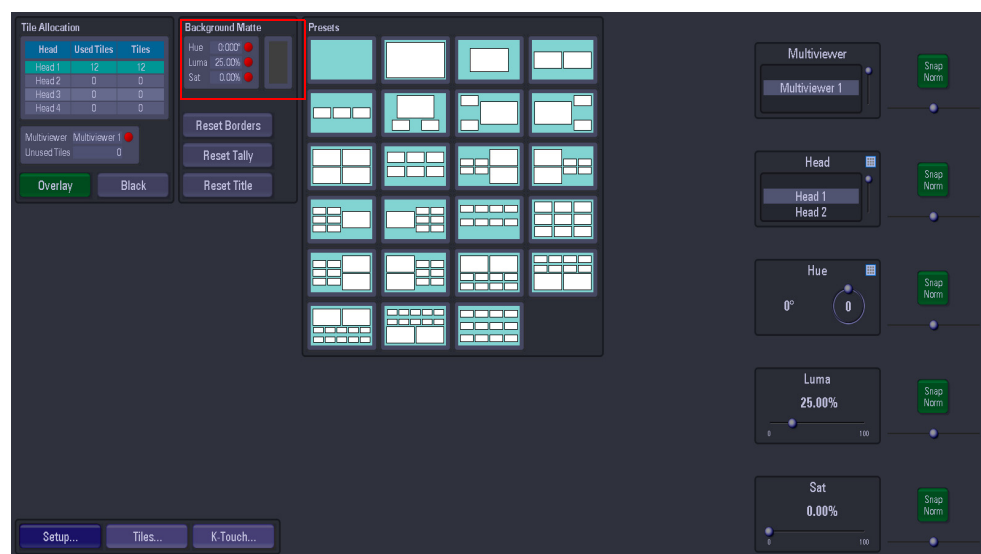
The background color can now be set using the Hue, Luma and Saturation controls.
Reset Borders, **Tally and Tile** - will reset back to the default state, any unsaved setups will be lost.

Preset

The Preset menu allows the you to select a multiviewer tile layout from a list of 23 layout options.
A layout can only be selected if there are enough tiles allocated to the head currently being used.
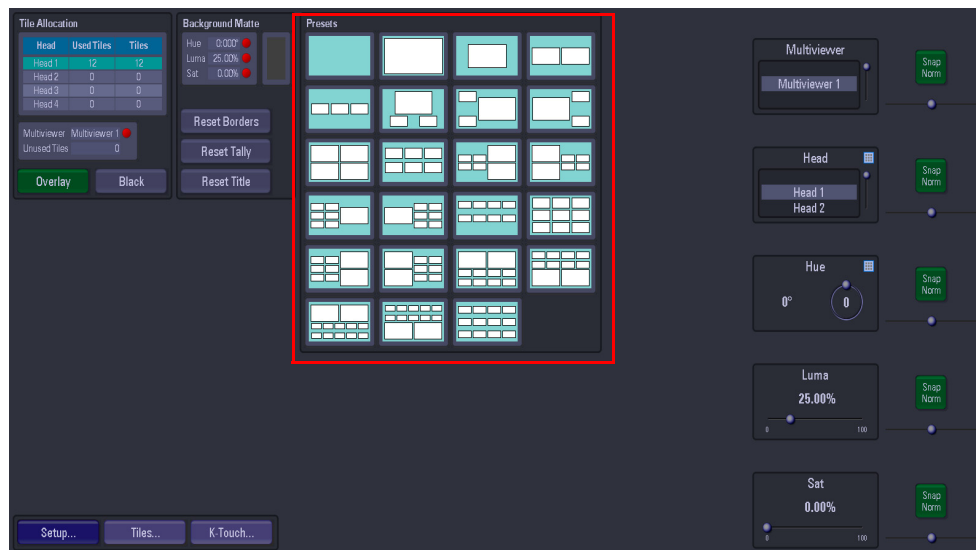
To use the preset layouts, make sure there are enough tiles allocated in the "Setup" menu, then touch one of the preset layouts. Once selected, the layout image will light up.
A user defined layout can be created by selecting a preset layout and using the "**Tile**" menu to reposition and size the tiles where as required.

Tile

The Tile menu is used to select sources for the tiles, reposition and resize tiles and set the boarder and border color around the tiles.
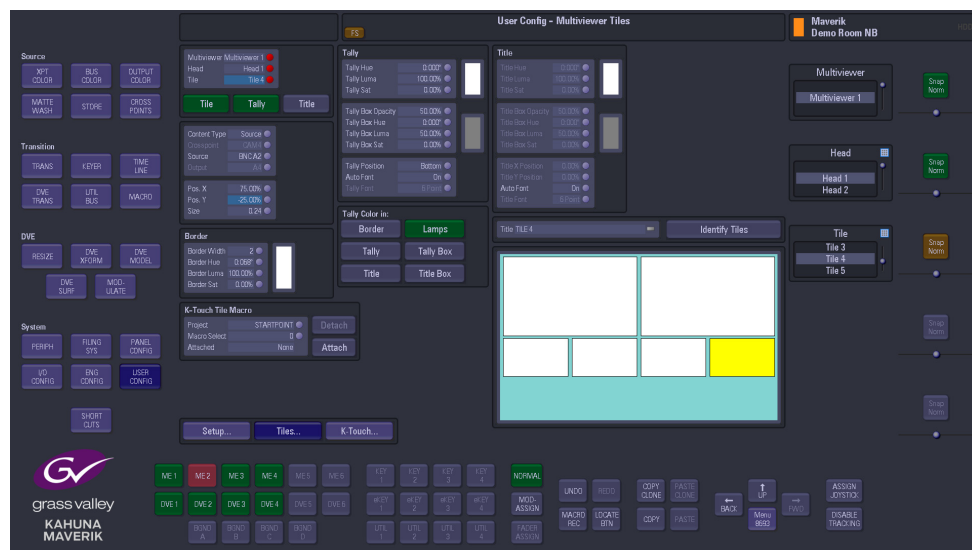
Tile setup is done on an individual tile basis, this is done by making sure that the "**Tile**" parameter is turned "On" and then use the "Tile" parameter to scroll through the tiles. The selected tile is yellow.

The next step is to select the type of source for the selected tile, there are 3 options to select from the "**Content Type**" parameter:

- From **Crosspoint**
- From **Source**
- From **Output**

Touch one of the options from the "**Content Type**" parameter, the user can either scroll through the options for each of the options, or touch the popup button and a list of options will appear (as shown below - Crosspoint popup). This multiviewer source selection has to be done for each individual tile.
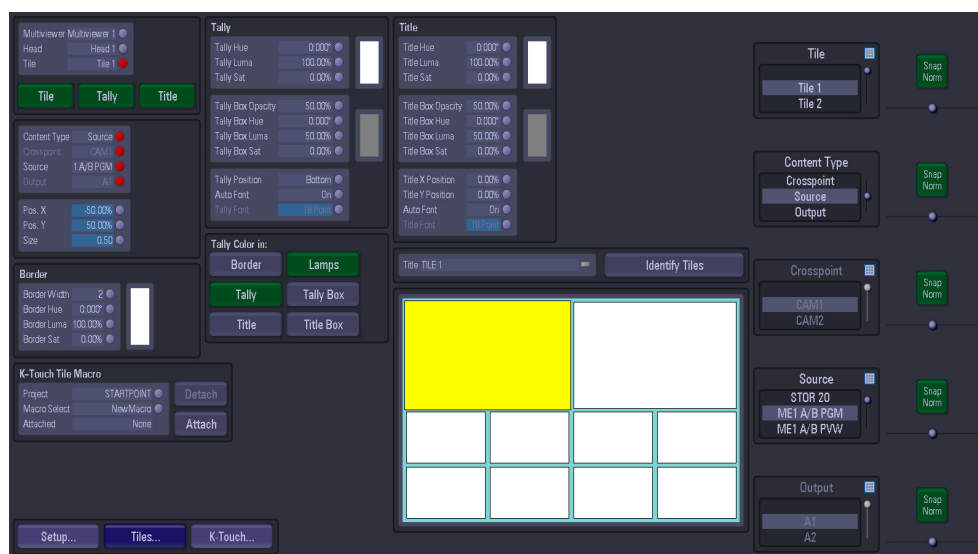
Tiles can be freely moved around the multiviewer screen area using the X, Y and Size parameters.
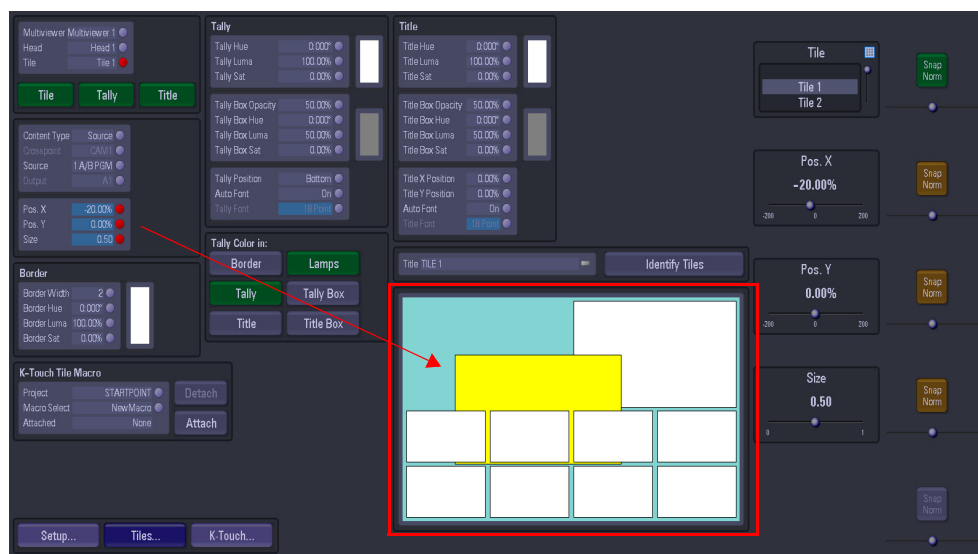
Use the parameter controls to position and size the selected tile as required.

The border around the edge of selected tiles can also be changed, touch the border width parameter to adjust the width of the border around the tiles, then touch the "**Border Color**" swatch to open the Hue, Luma and Saturation parameters that allow the user to change the color of the border.
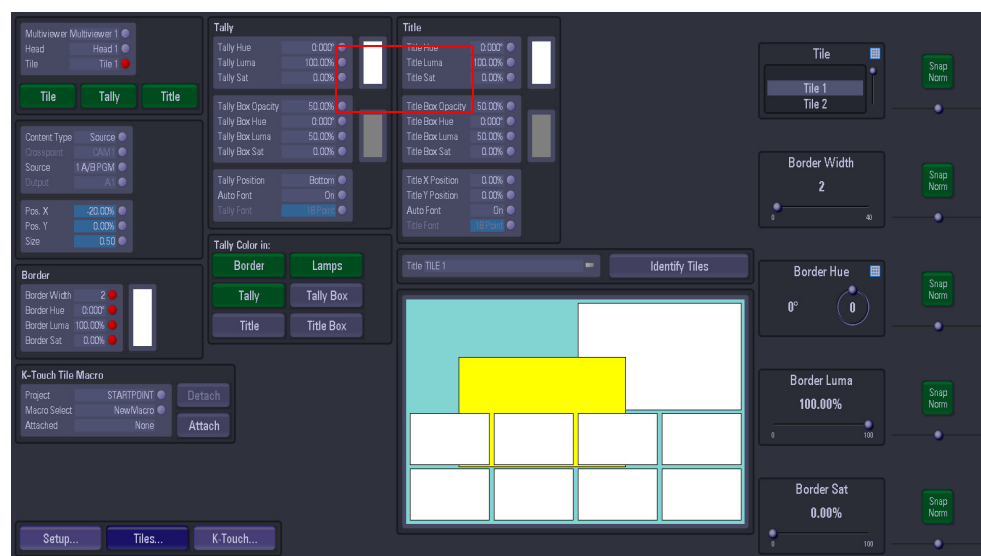
Touching the "**Identify Tiles**" button will display in the center of the tile the Tile Number, the multiviewer and head being used, the source feeding the tile and the output standard. the tile information will turn off once the button is let go.

Tally

The multiviewer tally menu allows the user to setup tally indicators and information for individual tiles, so that the user is constantly aware of the state of a source to a tile.
Use the "Tile" parameter to select the required tile, the user has the option to display tally information on a per tile basis or not by using the "Tally" On/Off (green) button.
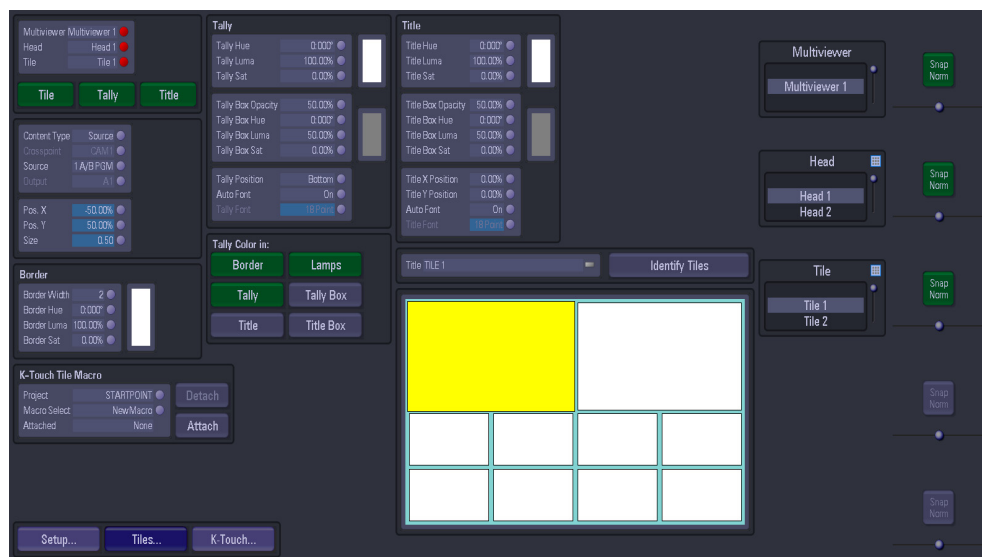
With the tally option now turned on for the selected tile, the source information is displayed in the center of the tally box i.e. ME2 OP1 or CAM1 etc. (the source information is automatically displayed when the sources for the tiles are setup in the Tile menu).
By default the **"Tally Auto Font"** parameter is set to **"On"**, this means that for the larger size tiles have a default font size of 18 point and the smaller tiles have a font size of 10 Point.
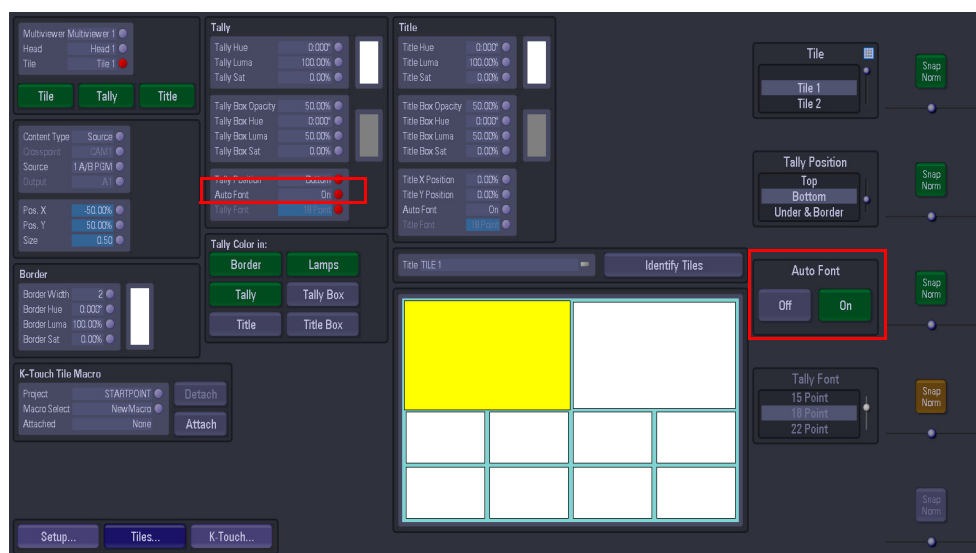
If the **Auto Font** button is set to the **"Off"** (unlit), then the **"Tally Font"** parameter can be used to set the tally font size for the selected tile. The font sizes range from 6 point up to 88 point.

The tally font color can also be changed by using the color parameters and adjusting the Hue, Luma and Saturation parameters (shown below).

Tally Box Opacity, will change the opacity of the box that the tally information is placed in. The tally box color can also be changed by using the Tally Box Color Parameters and adjusting the Hue, Luma and Saturation parameters (shown below).
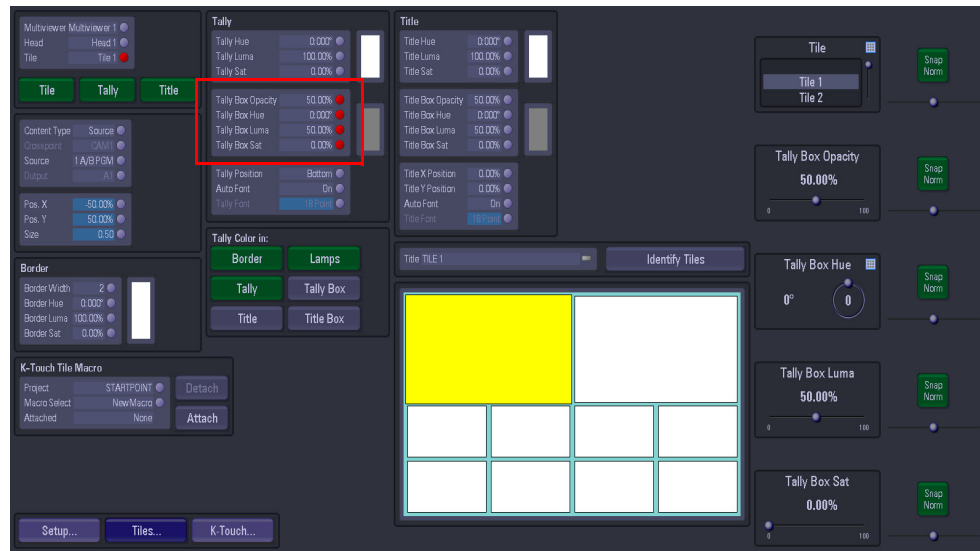
Tally Position parameter, when the **Tally Lamps** and **Tally** are displayed, the user is able to move the tally indicator position up and down the tile. The options are:

- **Bottom (default position)** - bottom just inside the tile border
- **Under & Border** - places the tally indicators below, outside the tile with a border around the tally indicator as well as the tile
- **Under** - under the tile with no border
- **Top** - at the top of the tile just inside the tile border
- **Over & Border** - places the tally indicators above, outside the tile with a border around the tally indicator as well as the tile
- **Over** - at the top of the tile with no border

The "**Tally Color In**" buttons will switch On or Off individual tally indicators, titles and title boxes.

Title

The **Title** menu as the name suggests, allows the user to place a title onto the selected tile. With the **"Auto Font"** button is turned On, the title font defaults to 18 Point. Turn the Title Auto Font button off and the font size can be changed using the **"Title Font"** parameter.
Touch the **"Title"** name red button twice and use the on-screen keyboard to type in a new title name.
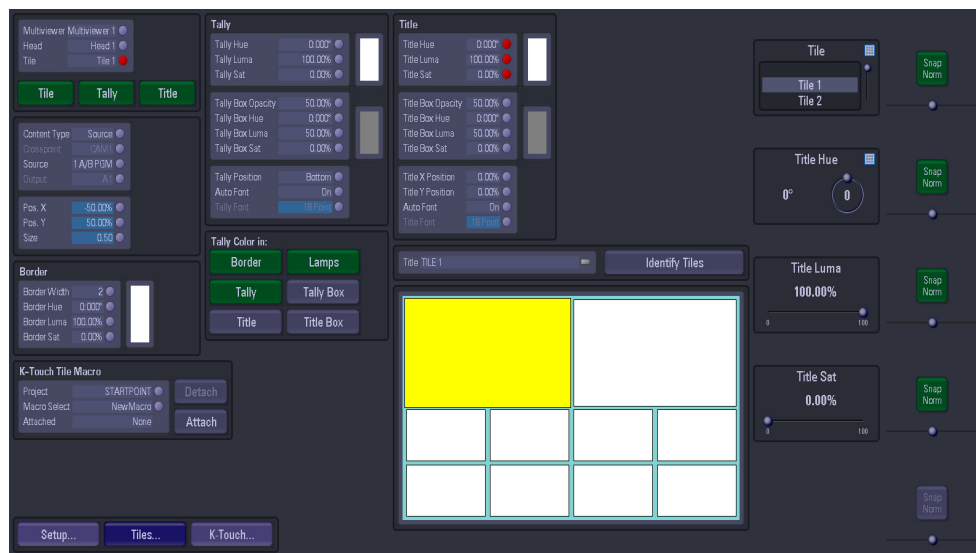
The **Title Color** can also be changed by touching the attacher (shown above) and adjusting the Hue, Luma and Saturation parameters.
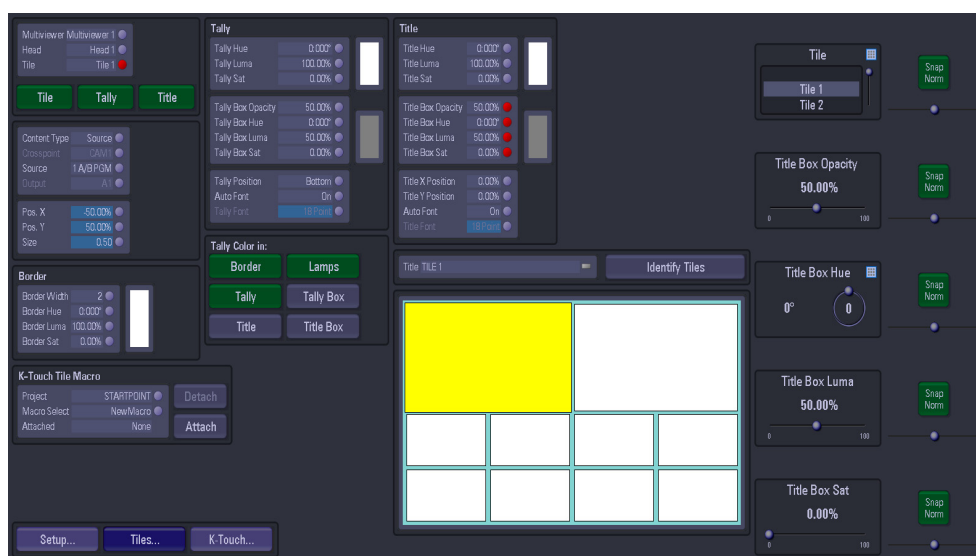
The **Title Box Opacity** parameter changes the opacity of the box that the title sits in. The Title Box Color can also be changed by touching the attacher and adjusting the Hue, Luma and Saturation parameters (shown below).

The Title/Title Box for each tile can be freely moved around the multiviewer space, using the "Title Position X, Y" parameters.

K-Touch

K-Touch software allows the user to create customized control touch screens. This provides a simple interface with live video for operators to control simple or complex effects using customized buttons on the 2nd touch screen.

The basic idea for having K-Touch is that provides an operational interface for gallery staff or even presenters.

With K-Touch the user can cut sources to the program, or select them to the preview, recall effects on the M/E banks, control the clip stores and select sub-clips. example of other functions are wipes, Clip transitions and mixes all by using customized buttons on the touch screen.

Equipment Required

To use K-Touch, the Kahuna system requires a second interface controller to allow the touch screen monitor to communicate with the mainframe. An optional Mav Remote ancillary panel can be purchased.

The diagram on the following page displays how to connect a Kahuna system up to use K-Touch.

Kahuna K-Touch Connection Diagram

Kahuna K-Touch Connection Diagram using the Mav Remote
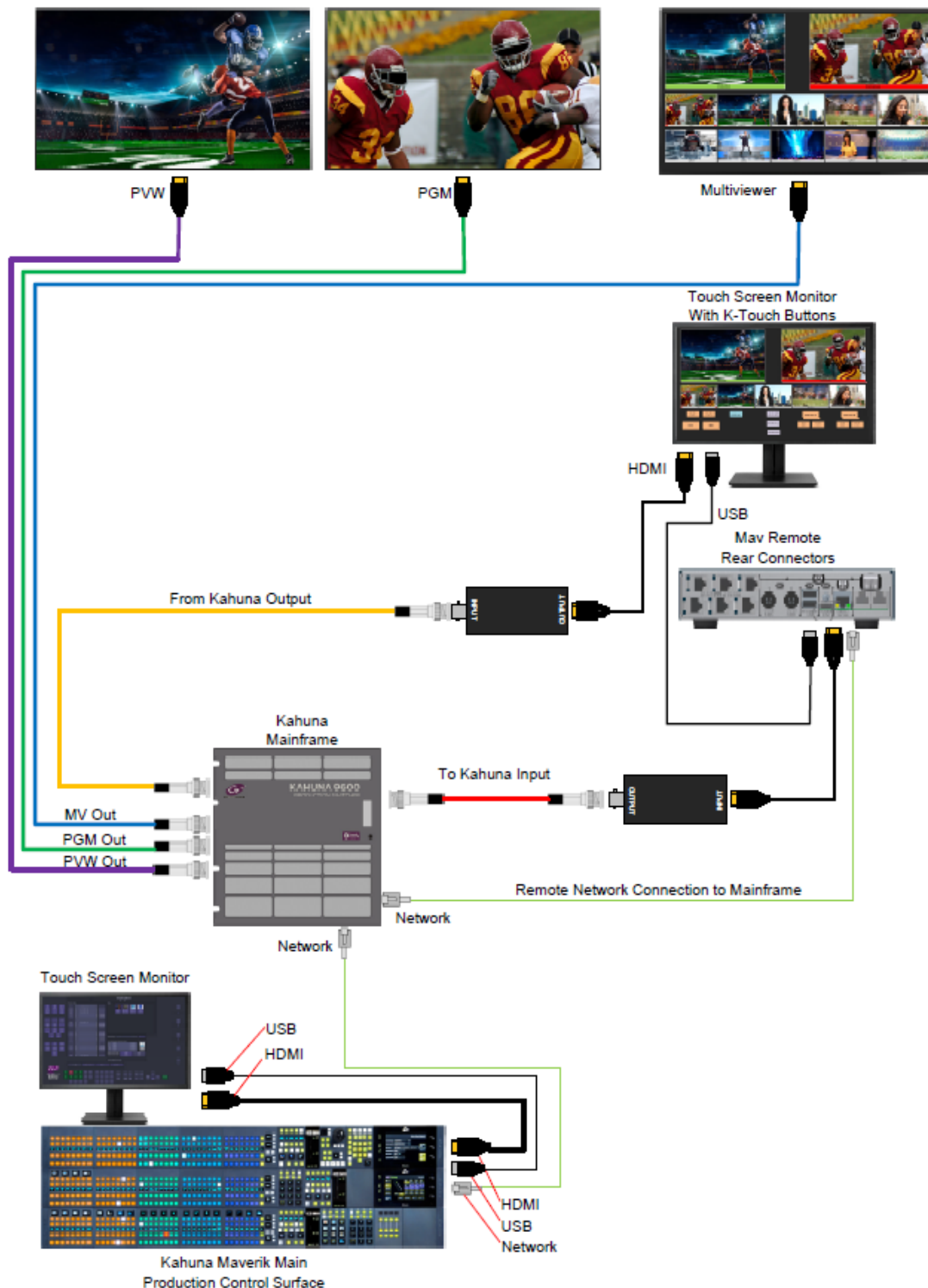
Note: The touch screen monitor that will be used for K-Touch has to be a 1920x1080 resolution.

K-Touch Setup

There are two ways to setup K-Touch on Kahuna, you can either have a K-Touch screen setup with just button functions, or you can setup a K-Touch screen with multiviewer tiles and button functions.

To setup the K-Touch multiviewer tiles, using the unused tiles on Multiviewer 1, for example if "**Head 1**" is allocated 6 tiles for the multiviewer and then allocate 6 tiles to "**Head 2**" for K-Touch. If you have a second "Router Card", then all 12 tiles for Multiviewer 2 can be used for K-Touch.
In the "**User Config - Multiviewer Setup**" menu, either use the "Head" parameter to select one of the four heads and allocate tiles, or use the "**Multiviewer**" parameter to select "**Multiviewer 2**".
Select one of the output Heads (1 to 4) and then select how many Tiles are required for the K-Touch output. Touch one of the "**Presets**" to form the basis for the video output tiles.
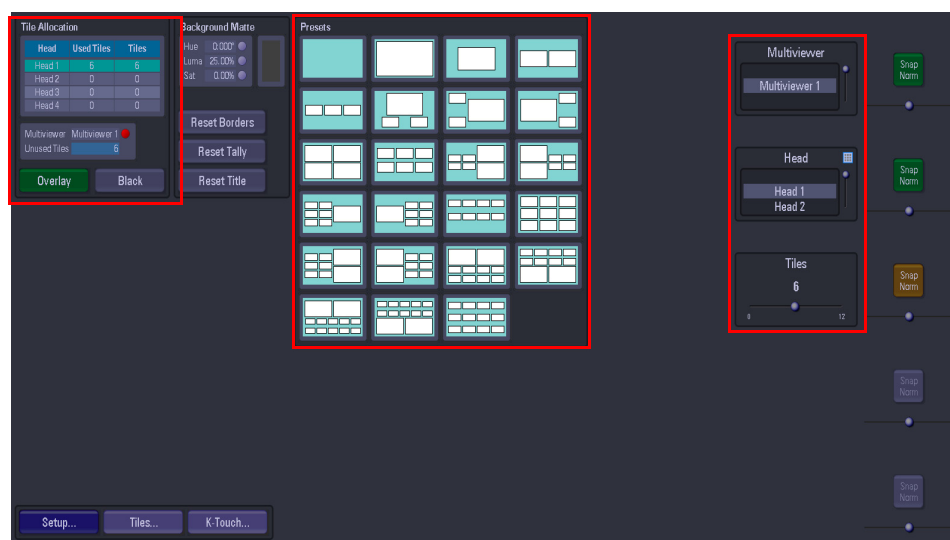
Touch the **{Tiles...}** button to open the "**Multiviewer - Tiles**" menu, here you can position the multiviewer tiles to the required position within the K-Touch window.
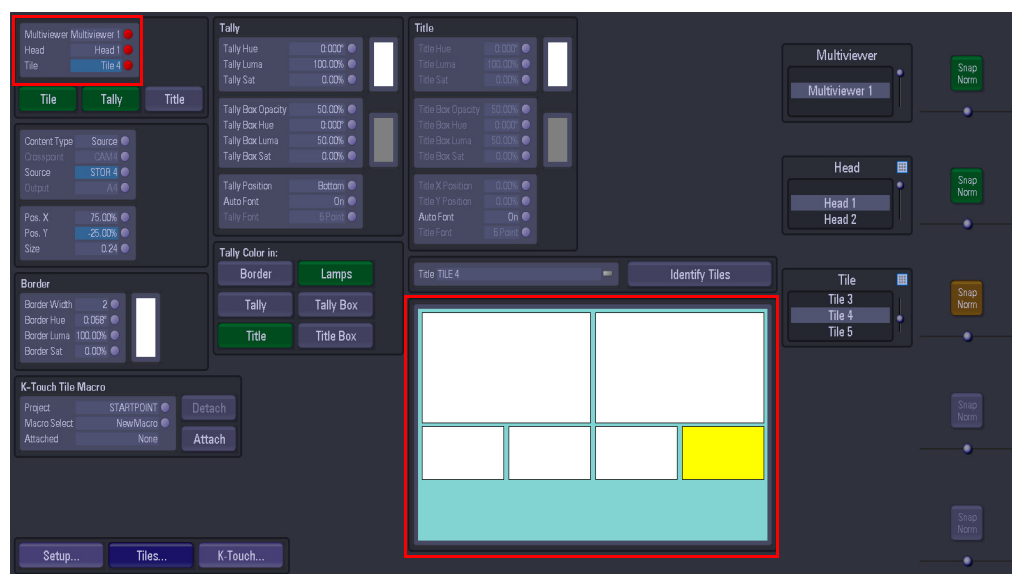
Touch a tile in the window and it will turn yellow, indicating that it is selected (as shown above). Then use the "**X/Y Pos and Size**" parameters to position and size the tiles to the required position within the window. At this point you can also add the required sources to each tile.

Touch the **{K-Touch...}** menu link button to open the "**K-Touch Setup**" menu.
In this menu, you can now setup on-screen touch buttons that can be linked to macros or using
the "Clone" function, clone button functions onto the touch screen buttons.

The "**Multiviewer**" and "**Head**" parameters display which multiviewer and head is being used
for K-Touch. Make sure the correct Multiviewer and Head are selected.
To start using K-Touch, touch the "**K-Touch Enable - On"** button.
GUI Input BNC - this parameter selects the input to the mainframe from the "**Monitor**" output
from the Mav Remote.

Tile Border From Macro - when "**Yes**" is selected, this allows a border to be added around a
macro button in the K-Touch window.
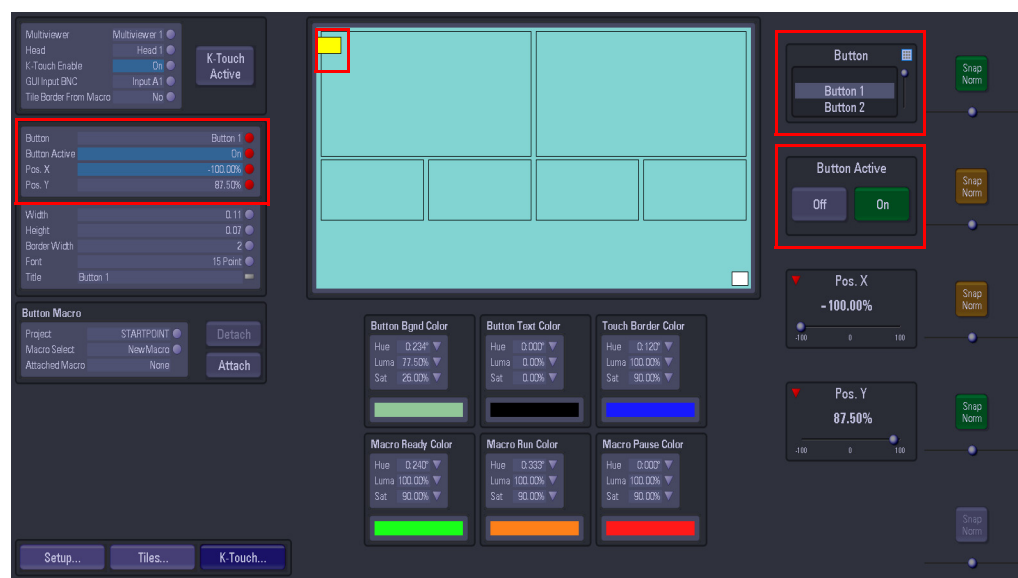
To start adding buttons, touch the "**Buttons**" attacher to display the button parameters, then
use the "**Buttons**" parameter to select "**Button 1**". Finally, touch the "**Button Active**" **{On}**
button. A small yellow rectangle will be displayed in the top right of the K-Touch screen, as in
the menu shown above.

All adjustments to the position and size of the button are made using the using the "**Pos. X/Y**" and the "**Width**" and "**Height**" parameters.
To add another button, use the "**Button**" parameter to select "**Button 2**" and touch the "**Button Active**" **{On}** button.

Adding Functions to K-Touch Buttons

To add a macro to a button, use the "**Button Macro**" parameter. Select the button, then use the "**Project**" parameter to select the project which has the macro, then use the "**Macro Select**" parameter to select the macro file. Finally touch the **{Attach}** button.
The macro is now attached to the selected button.

You can also use the "**Copy Clone**" function to copy a button function from the control surface or from another menu, and attach to the K-Touch button.

Panel Configuration

Panel Config Overview

Press the **[PANEL CONFIG]** button on the Soft MLC GUI panel to enter the Panel Config menu. In this menu up to 1000 (0 to 999) user specific Panel Config files can be saved into a Project and is one of the most important menus for the user when setting up a Kahuna system.

Saved Panel Configs Files

Panel Config Details

Currently Selected File

Current Project
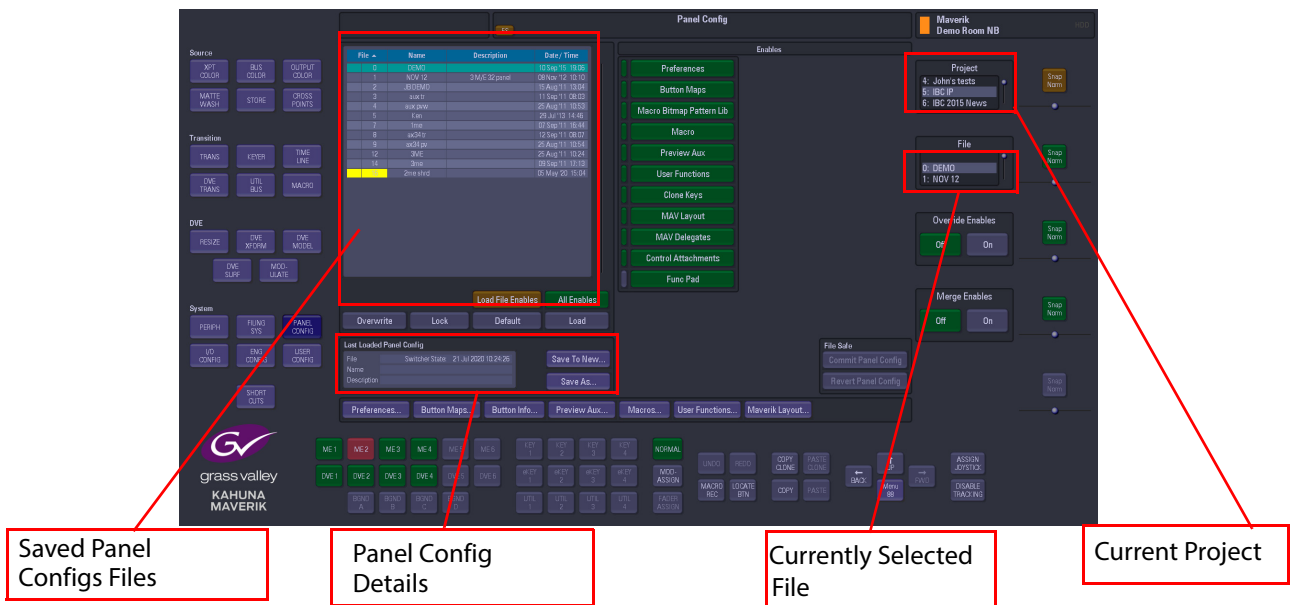
Panel Config Main Menu Description

The Panel Configuration is one of 4 main configuration functions used when setting up a Kahuna system. In this menu the Preferences for the GUI and Control Surface are determined, Preview Aux, Button Maps and User Function Buttons are some of the features that can be setup. It is important to understand how to navigate the main menu to learn how to Create, Save and Load user specific configurations.

Create a New Panel Config

To make a new config file, touch the **{Save As…}** menu link button and the **Panel Config - Save As** menu is displayed. In the center of the menu screen there is a table showing all the saved panel config files in the current project. Use the "**Destination**" parameter to scroll down to an empty row in the table. Use the "**Name**" parameter with the on-screen keyboard to name the file, then add a description. Finally touch the **{Save}** button to save the new file into the table.
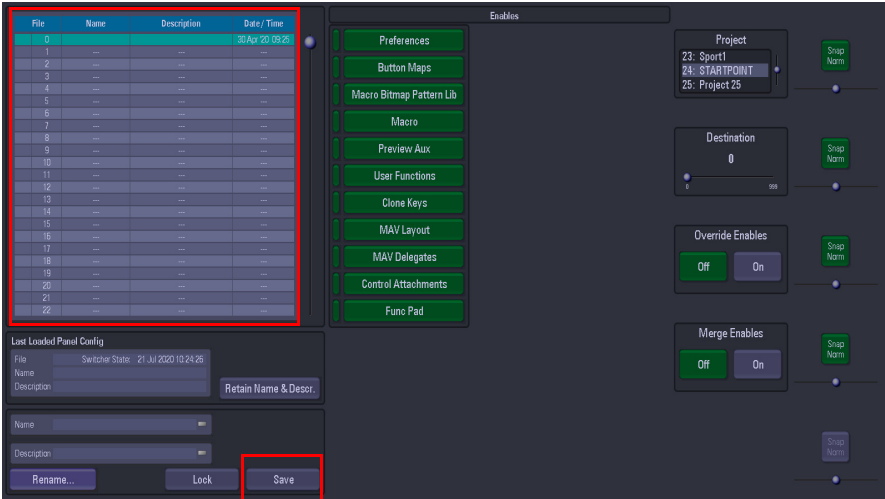
Enables

This menu allows the user to enable/disable certain functions that are related to the Panel Config setup, such as Button Maps, Macros, Aux Panel functions and User Function Buttons, etc. when saving a Panel Config File.
The small green tab next to the function enable button will display if a function has been saved with a panel config file or not. If the tab is gray, the function next to it is not included in that saved panel config file.

De-selecting an enable will mean the function will NOT be included when saving the User Config and subsequently; NO change will be applied to that function when loading that DMEM/GMEM.
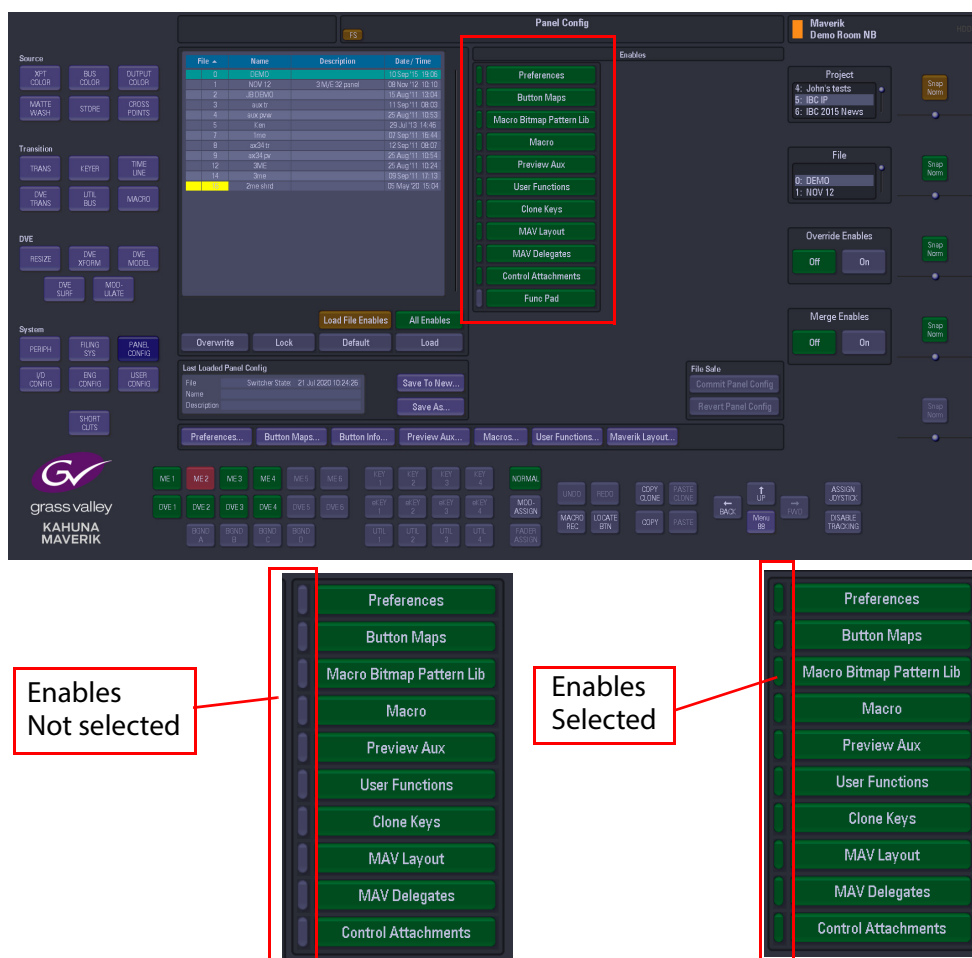
Overwrite - this will overwrite the currently selected file.
Lock - this will lock the file and will stop attempts to overwrite or delete the file.
Load - will load the currently selected file
Save - will open the Save As menu, so that the user can save the selected/de-selected enables into a Panel Config.
Override Enables - will override any enables that have been de-selected and turn the enable on.
Merge Enables - this function merges the enables currently set in the switcher with the enables saved in the file that is being loaded (a 'logical OR' of the enables).

> Note: Enables can be selected or de-selected when saving a panel config file in the "Panel Config - Save As" menu.

Loading a Pre-saved Panel Config

To load a pre-saved Panel Config, scroll up and down the File parameter control to reach the required file, then press the **{Load}** button. The selected file will then be entered into the Current Config attacher box. Pre-saved config files can also be deleted or over written in this menu.

> Note: It is advisable that after any change to a file in the Panel Config menu, Save the Configuration!

Preferences

Preferences menu allows the user to enable/disable functions on the GUI and Control Surface.

GUI Preferences

GUI Preferences are a set of options that are designed to help the user access or control functions within the GUI more quickly and efficiently.

Menu Select Button - This menu allows the user the choice of two styles of menu navigation.

- **Top** is used when traveling between different menus using the GUI panel buttons the system enters via the 'Top' menu, or front page of that 'menu tree'.

- **Last** is used when the GUI records the last menu the user was in before leaving that menu tree.

For example: In Top mode, press the **{Timeline}** button on the GUI and then press the **{Enables…}** menu link button, next press the **[User Config]** button on the GUI. Now re-enter the Timeline menu, notice that it is the Timeline main menu page, not the Enables menu. The Last mode would re-enter the Timeline Enables menu.

Display Saver Timeout - use the parameter control to adjust the Screen Saver Timeout in minutes, the time is set to 5 minutes as a default, but the timeout range is from 0 min. to 59 min., "0" means that the screen saver has been deactivated and the GUI screen will stay on constantly. Once the timeout is active the GUI screen goes black, any touch of the screen or a button will bring the GUI screen back up. Adjust the parameters using the parameter controls on the right side of the screen.

Display Brightness - is an adjustment for the GUI screen brightness, set to 100.00% as a default, the brightness ranges from 0 to 100.00%. Adjust the parameters using the parameter controls on the right side of the screen.

Color Scheme - this will set the Soft MLC GUI menus to a light Grey (Classic Grey) or the default Kahuna blue.

Timecode Mode - this sets timecode increments to be set to the nearest Frame or Field.

Store Load On Press - this gives the option to load a still when pressing a minipic in the Store menu, or by selecting "No", allows the user to select a still but not actually load until the {Load} button is pressed. This allows the user to clone the still selection by "Copy, Copy" pressing a minipic and "Paste, Paste" the action onto a User Function button. The still will not load into the selected Store until the User Function is pressed. The selected Still can also be loaded into the selected store by pressing {Load Selected Still} in the Shortcuts menu.

Sub-Clip Active On Press - this will load a sub-clip into a store when touched in the Store - Sub-clips menu.

Keyboard and Mouse
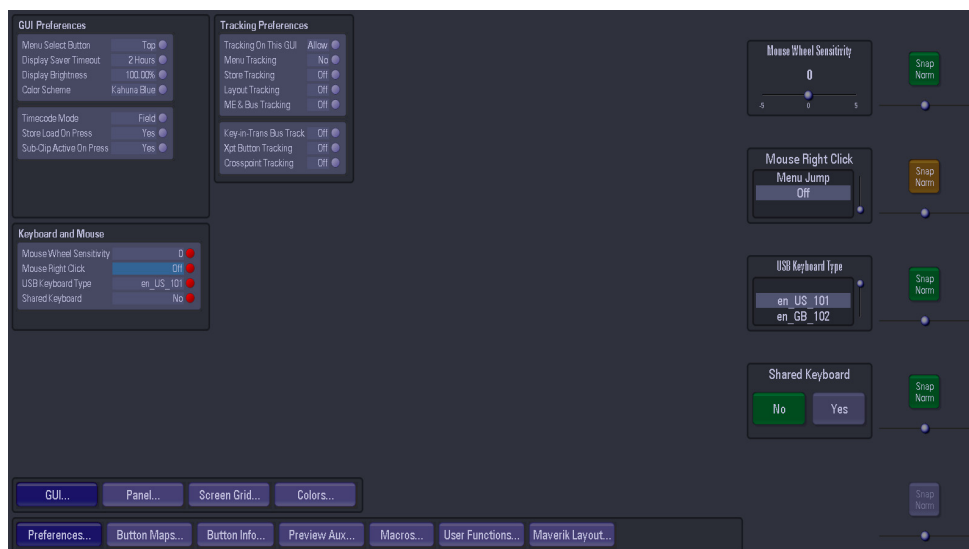
Mouse Wheel Sensitivity - allows fine adjustment for the mouse wheel.

Mouse Right Click - when using a mouse to control GUI menus, this parameter allows the user to select what happens when the right mouse button is clicked:
Menu Back, Menu Up, Menu Forward, Menu Jump or Off.

USB Keyboard Type - the user can now select between 22 different types of USB keyboard preferences, US, UK, French, German, Spanish and Latin American etc. Use the parameter control to scroll through the keyboard type options. This option is saved in the EEPROM of the Panel and not in the Panel Config.

Shared Keyboard - this allows a USB keyboard to be used.

Tracking Preferences
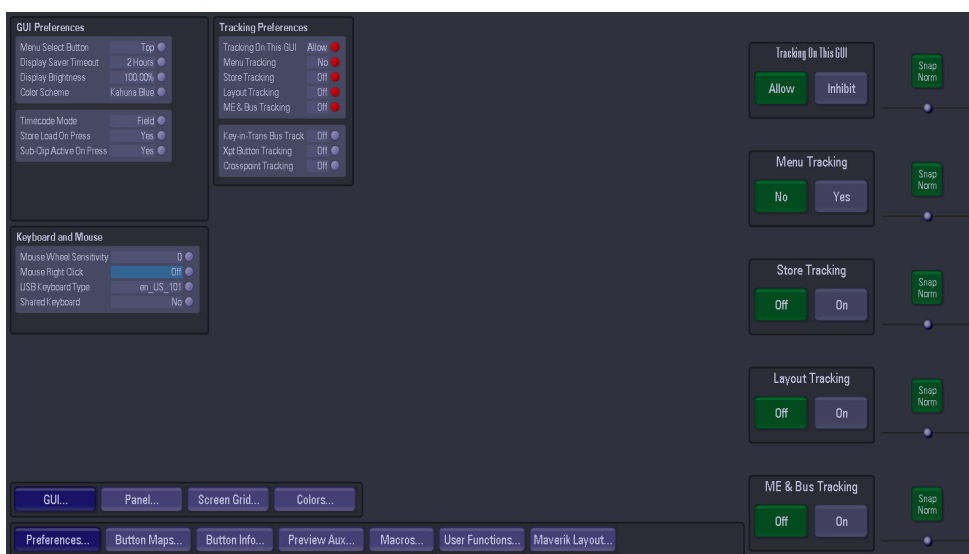
Tracking On This GUI - this Inhibits or Allows all the GUI tracking preferences listed in this menu.

Menu Tracking - Enables various button presses to cause the GUI to switch to an associated menu. Used by keys like WIPE, MIX, FTB, BORDER, MASK, RESIZE etc.

> Note: There are independent enables for Maverik GUI and Legacy GUI

Store Tracking - See details of crosspoint-tracking

Layout Tracking - When enabled, the indicators on the panel user-function menus will follow when a button on a user function block are pressed, e.g. pressing a button on a USR or ATM module will update the Layout, Page and Button selectors on the Pages menu to change to reflect the button that was pressed.

ME & Bus Tracking - Causes the menu ME delegate and the menu BUS delegate to follow when the ME or BUS delegate to changed elsewhere on the panel (crosspoint delegate buttons or key control block key buttons etc).

Key-in-Transition Bus Track - If enabled, double-pressing the key-in-trans buttons in the transition control block will cause the menus to track to the Keyer Control menu.
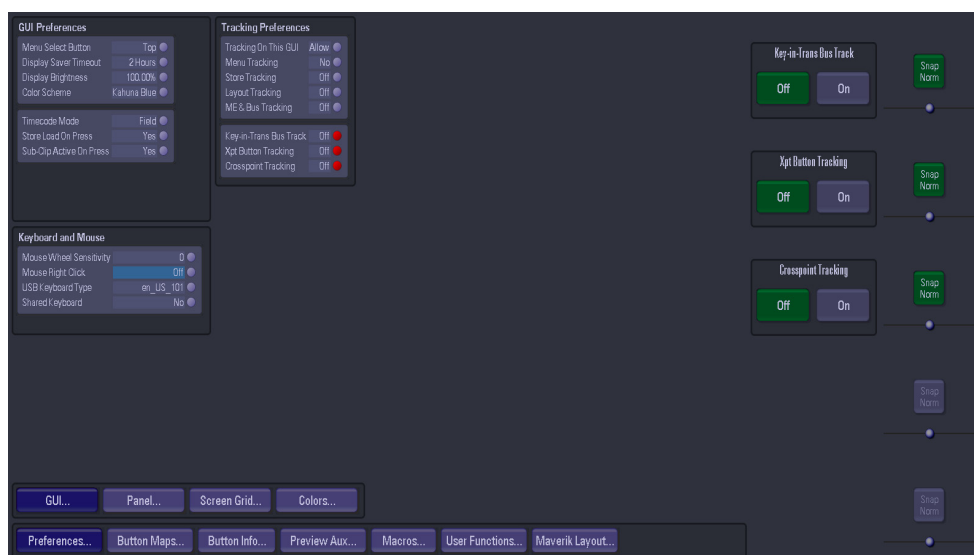
Xpt Button Tracking - if enabled, the row selector control in the button map editor menu will follow which crosspoint button is pressed.

Crosspoint Tracking - Causes various menu jumps and changes of delegates depending on what source is on a crosspoint button when it is pressed. e.g. Pressing a crosspoint that selects a matte will cause a jump to the matte menu and will set the matte selector to the appropriate matte.

> Note: Crosspoints that select a store will only be tracked if the store-tracking option is also enabled.

Panel Preferences

Panel Preferences are a set of options that are designed to help the user access or control functions on the Control Surface more quickly and efficiently.

Panel Preferences
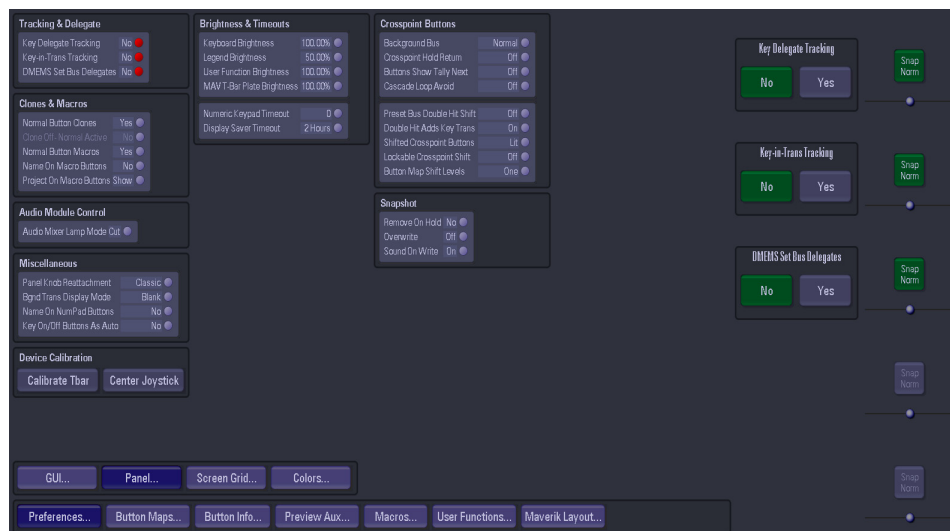
Key Delegate Tracking - If enabled, changing the bus delegate on the upper or lower crosspoint rows will cause the delegate on the key control block to track the bus selected. If an inappropriate bus is selected (such as AUX 3), the tracking is ignored.

Key-in-Transition Tracking - If enabled, double-pressing the key-in-trans buttons in the transition control block will cause the delegate on the key control block to track the bus selected. If an inappropriate bus is selected (such as AUX 3), the tracking is ignored.

DMEMS Set Bus Delegates - there is an 'Events' enable for DMEMs. When you save a file, the current delegates (Key, Bgnd etc) will go into the DMEM file. If you have "DMEMs Set Bus Delegates" enabled, when you load the DMEM, the delegates will be updated. As with other parameters, you can save or load the file without the delegates by using Override-Enables and turning off the "Events" enable.
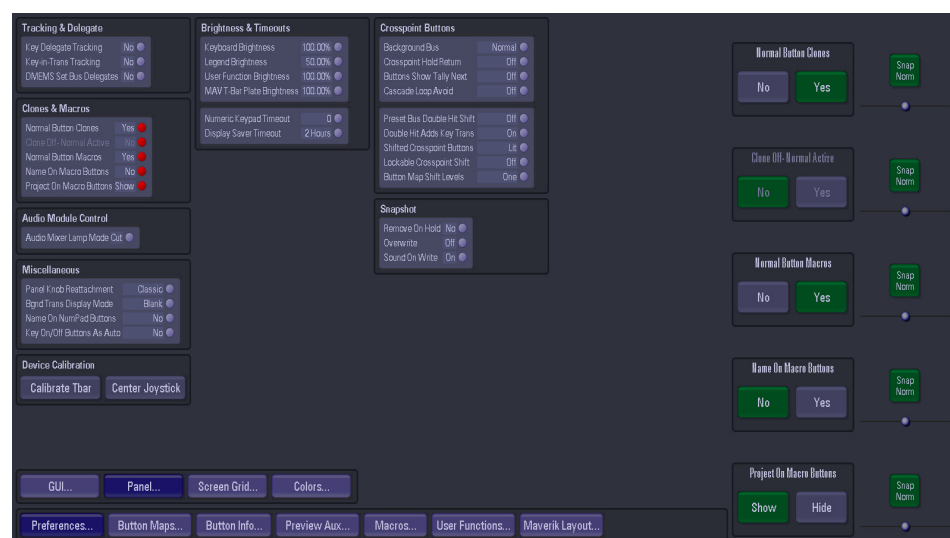
Normal Button Clones - this enables/disables the Clone Enable button on the control surface.

Clone Off - Normal Active -

Normal Button Macros - this enables/disables the Macro Enable button on the control surface.

Name On Macro Buttons - when set to "Yes", will add the name given to the macro to the macro button by default.

Project on Macro Buttons - when set to "Show", will add the project number to the macro button by default.

Audio Module Control

Cut - lamp is red when the audio channel is Muted/Off, and equivalent back-lit when On.
On - lamps are active when the audio channel is On, and equivalent back-lit when Muted/Off

Miscellaneous

Panel Knob Reattachment - this function has 2 modes:

- *Classic* - the Key Control functions that work in conjunction with the Assignable Controls will behave in the normal way.
- *Safe* - when using the Key Control functions in conjunction with the Assignable Controls for Resize, Border, Mask and Bus Color, pressing the function button in the Key Control area will make the button go Green, and the Assignable Controls will reflect and adjust the selected function.
  If a different function is selected, the previous function button used in the Key Control area will remain Green, this allows the user to step back and forth between the selected functions.

To switch the function off, press and hold the button, and the Green light will go off.

Bgnd Trans Display Mode - This parameter determines what is displayed on the left-hand display in the row of five displays on the TBAR module. The choices are Blank, Next-Bgnd, Current-Bgnd, Wipe-Mode and Trans-Time.

Name On NumPad Buttons - selecting "Yes" will place copied and pasted names on number pad buttons.

Key On/Off Buttons As Auto - this will enable/disable the Key On/Off buttons to follow the "Auto" button when the button is pressed.

Device Calibration

Calibrate Tbar - as the name suggests, this is used to calibrate the Tbars on a control surface. Touch the button and it will turn orange. Now move the Tbar to its top and bottom end-stops several times until the orange "Calibrate Tbar" button turns gray again.

Center Joystick - if you control surface has a joystick, touch the {Center Joystick} button and it will turn orange. Move the joy stick to the center position and the button will turn gray.

Brightness & Timeouts
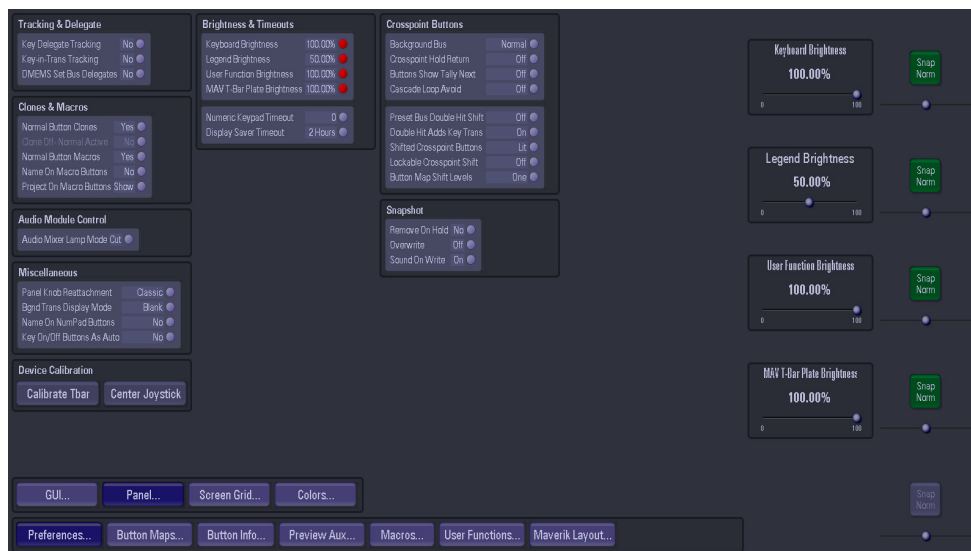
Keyboard Brightness - this adjusts the brightness of all the buttons on the Maverik control surface.

Legend Brightness - this adjusts the brightness of the mnemonic displays on the Maverik control surface.

User Function Brightness - this adjusts the brightness of the OLED user function buttons.

MAV-T-Bar Plate Brightness - adjusts the brightness of the T-bar plate.
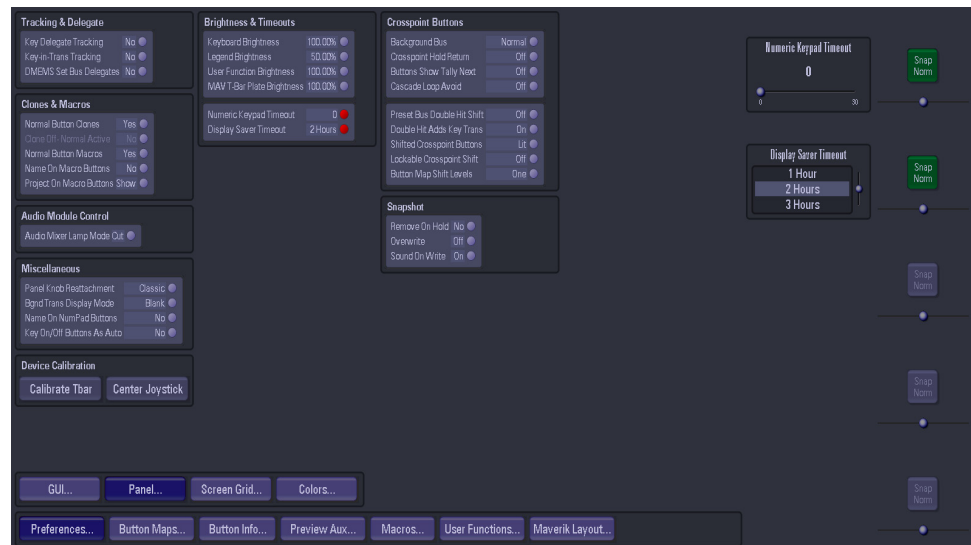
Numeric Keypad Timeout - use the parameter control to adjust the numeric keypad timeout in increments of 5 minutes, up to 30 minutes. When set to 0 the keypad will not timeout.

Display Saver Timeout - this cause the MAV-GUI display to go into a sleep mode after a defined amount of time, if the MAV-GUI is not used. Default is 2 hours, maximum On time is 4 hours, can also be disabled so the MAV-GUI is on constantly.

Crosspoint Buttons
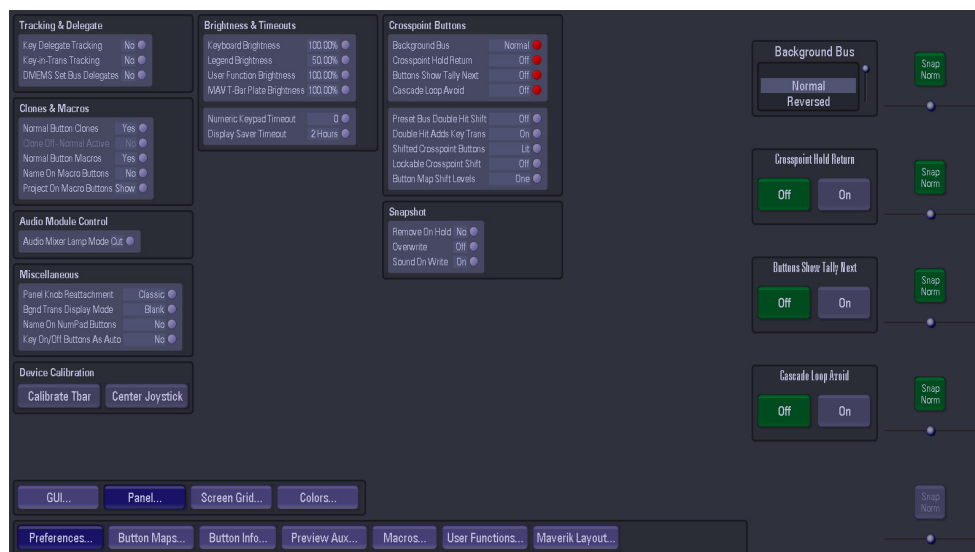
Background Bus - use the parameter control to step through Normal, Reversed and Follow Tbar.

Crosspoint Hold Return On/Off - this allows the user to hold down crosspoint button 'A' and then additionally press button crosspoint button 'B'. Pressing 'B' will select that crosspoint until 'B' is released, at which point the crosspoint selection returns to that for 'A'

Buttons Show Tally Next - this is used in conjunction with the **User Config - GPO Setup** and allows the tally function to show what is being tallied on.

Cascade Loop Avoid - avoids cascade loops when setting up button maps etc.

Preset Bus Double Hit Shift - when turned On, if a Preset Bus button is pressed twice quickly, the Preview monitor and mnemonic will display the source and name of the "shifted" crosspoint. The panel will reflect this by either lighting the SHIFT ARROW and the XPT button or just the SHIFT ARROW. This is determined by the user preference Shifted Crosspoint Lit/Unlit.

Shifted Crosspoint Buttons - this function when turned On will cause the Shift button to light up Red or Green (depending if the crosspoint is live to air) and allow the user to see that the Shift function is being used.

Lockable Crosspoint Shift - this will allow the locking of the shift function to display the shifted Xpts continuously.

Button Map Shift Levels - this allows up to 3 shift crosspoint levels when creating button maps

Snapshot
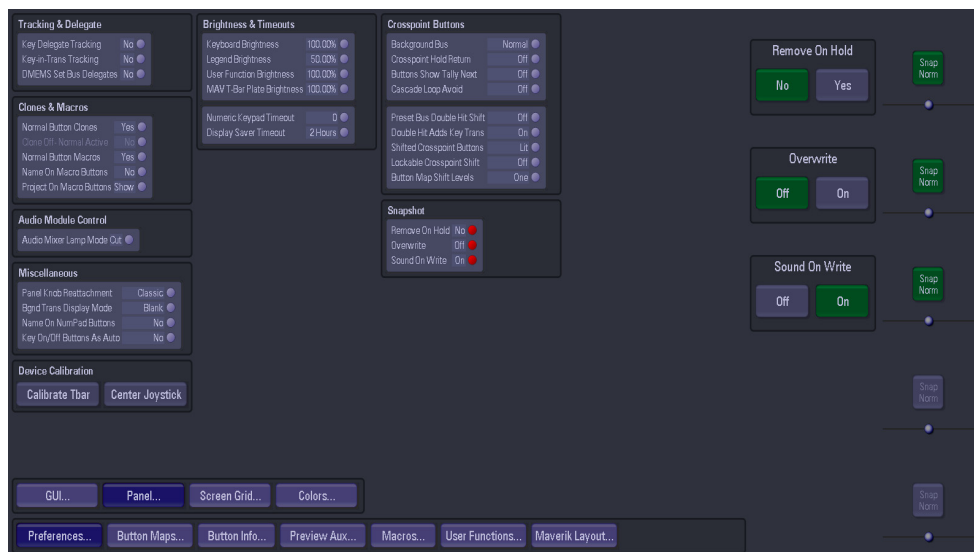
Remove on Hold - to remove a Snapshots from the OLED buttons, touch the **"Snapshot"** attacher, then in the parameter controls on the right side of the menu, select "**Remove On Hold"** "Yes". An existing snapshot can now be removed from a User Function button by holding down the snapshot button.
You can still create a snapshot by holding down one of the OLED buttons.

Overwrite - will allow a Snapshot that is attached to a User Function Button to be overwritten or not.

Sound On Write - this tuns On/Off a sound (Beep) when a Snapshot is recorded.

Screen Grid

The Screen Co-ordinate System is a tool by which the user can adjust the display of co-ordinates on the GUI screen, co-ordinates that relate to the Resize engine, Mask areas and Wipe positions.
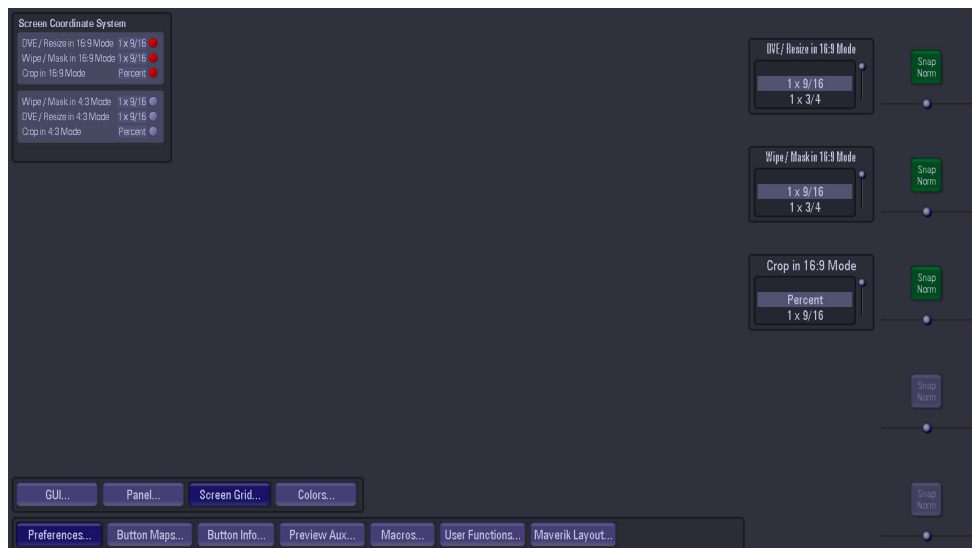
Screen Grid Crop: The ability to set the crop positions into Screen Grid mode (as per Wipe/masks) to allow the copying of Positions and Crops. To copy parameters "press and hold" the **{COPY}** button on the GUI and select the parameter using the **{Snap Norm}** button associated with that parameter.
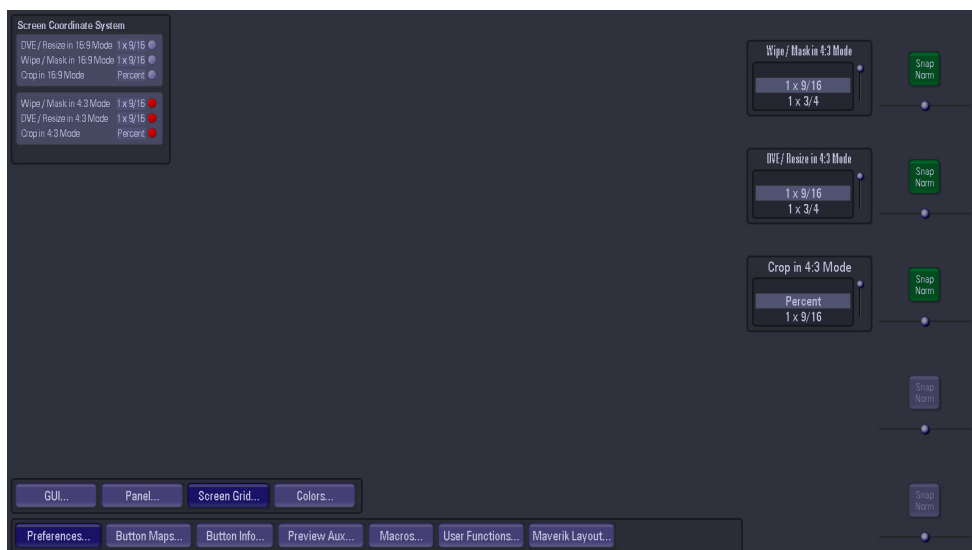
Multiple parameters can be copied while copy button is held down, next go to the parameters you want to paste these values too, hold down **{PASTE}** and press the **{Snap Norm}** button associated with that parameter. The default mode for the Crop grid is percent.

Colors

Button Colors

This menu allows the user to set user defines color schemes to specific buttons on the control surface and knobs on the MAV-GUI and change color schemes for actions and alerts.
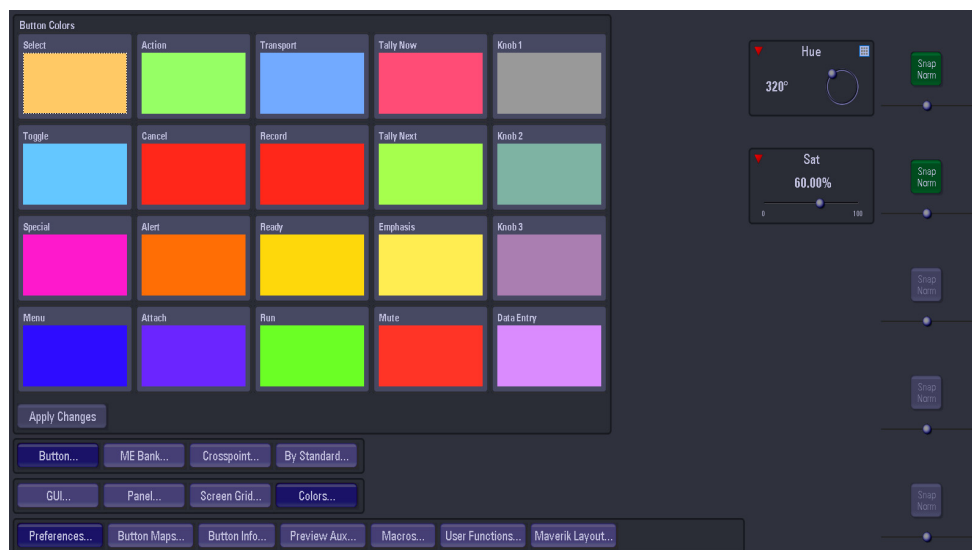
All of the buttons and knobs and alerts on the MAV-GUI and the control surface can have their default color schemes changed in this menu. The diagram above shows an example of the Tally Now adjustment menu. touch one of the items in the main menu and an adjustment menu will appear.
The default color can be changed by adjusting the Hue and Saturation parameters. Touching the **{Classic Mode}** will put a uniform backlight on the buttons on the control surface.

ME Bank Colors

This menu allows the user to set different color schemes for individual M/Es on the control surface.
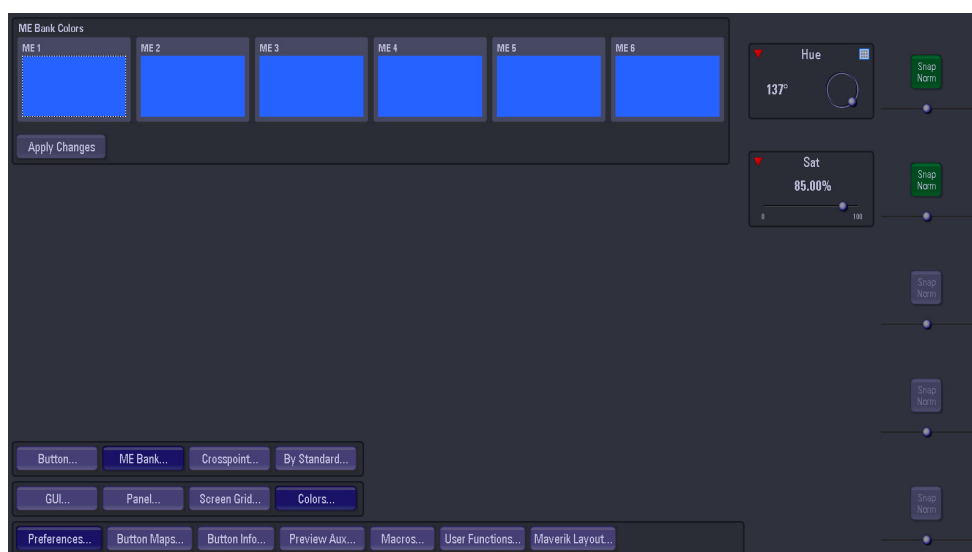
Adjusting the parameter control will change the color scheme on all the available M/Es.
Press the **{Apply}** button to apply the color scheme to the M/Es.

Crosspoint

The Crosspoint menu allows the user to change the preset color scheme of the Maverik Color crosspoint buttons.
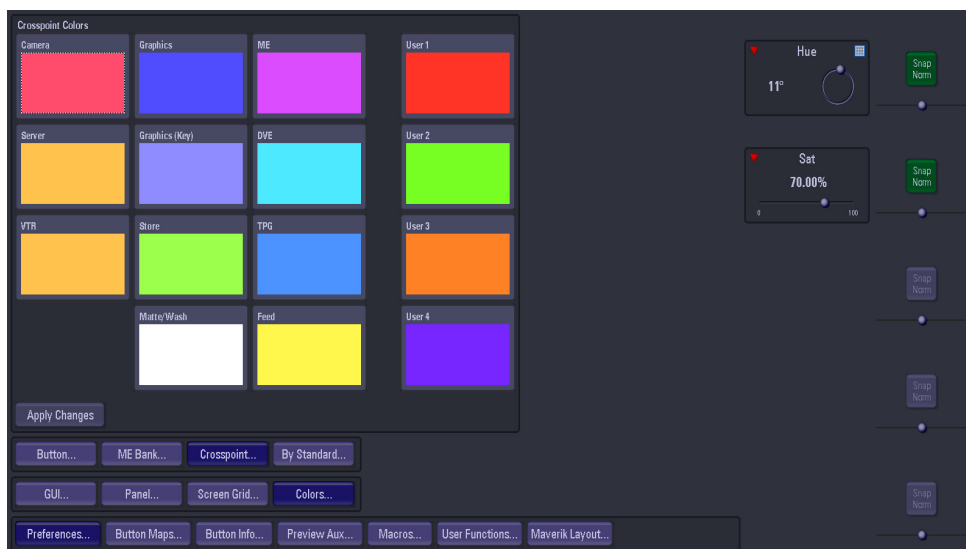
In the **Crosspoint Mapping** menu on the **GUI**, the user can select crosspoint in the table and then use the **Maverik Color** parameter to set a preset color scheme for the selected crosspoint. The Other Colors menu allows the user to select and change the preset colors in the Maverik Color list. Touch one of the colors and then use the Hue and Saturation parameters to adjust to the desired color, then press the **{Apply}** button.

By Standard Colors

This menu allows the you to set crosspoint button color for the video standard for the source assigned to that crosspoint. So that the crosspoint buttons will display different color schemes for video standards on the control surface.
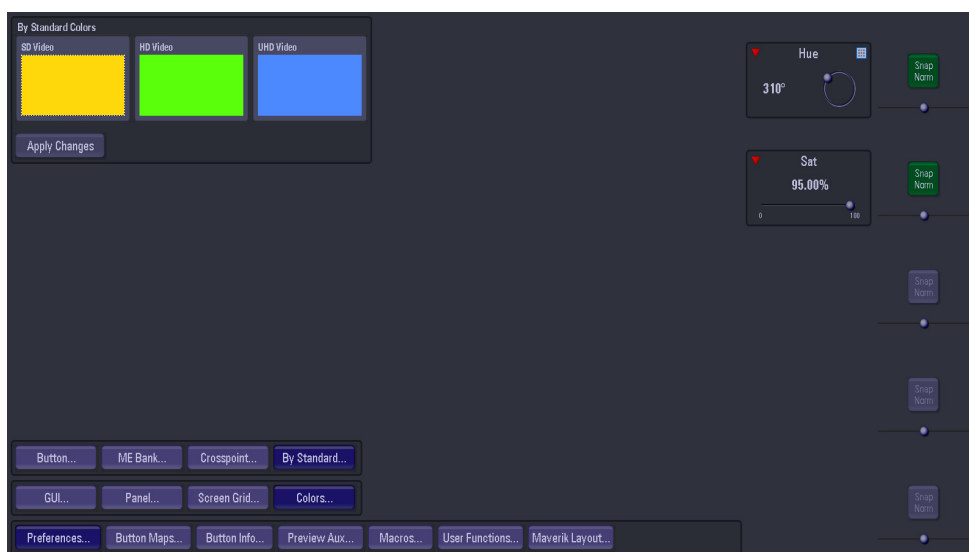
You can keep the default color scheme for the video standards or touch one of the colors to select it and then use the Hue and Sat parameters to alter the color.

When done, touch the **{Crosspoints}** menu button and then touch and select a crosspoint in the menu table, that you want to set a video standard.

Set the "**Color By Std**" parameter (shown above) to "Yes". An asterisk "*" is displayed next to the lamp color name in the "**MAV Lamp Color**" column.

Button Maps

In the Panel main menu, press the **{Button Maps…}** menu link button to enter the **Panel Config - Button Map Assignment** menu.
In this menu, the mapping of the control panel buttons to the system's crosspoints can be changed to suit a user's preference on a bank-by-bank or M/E by M/E basis. Button maps are easy to setup and are the preferred way to setup crosspoints on a control surface.

Buttons on the Buses can have any source assigned to them using a Button Map. This can be done by saving and loading Button Map Files, or by creating Custom maps.
When assigning sources to buttons on the Buses, it is normal the button map to be assigned on each ME or Aux so that whatever physical bank that ME or Aux is delegated to, that map will appear on those buttons. There is, however an additional mode of operation Bank Override. In this mode, a physical bus is forced to have a specific button map regardless of what that bank is delegated to control.
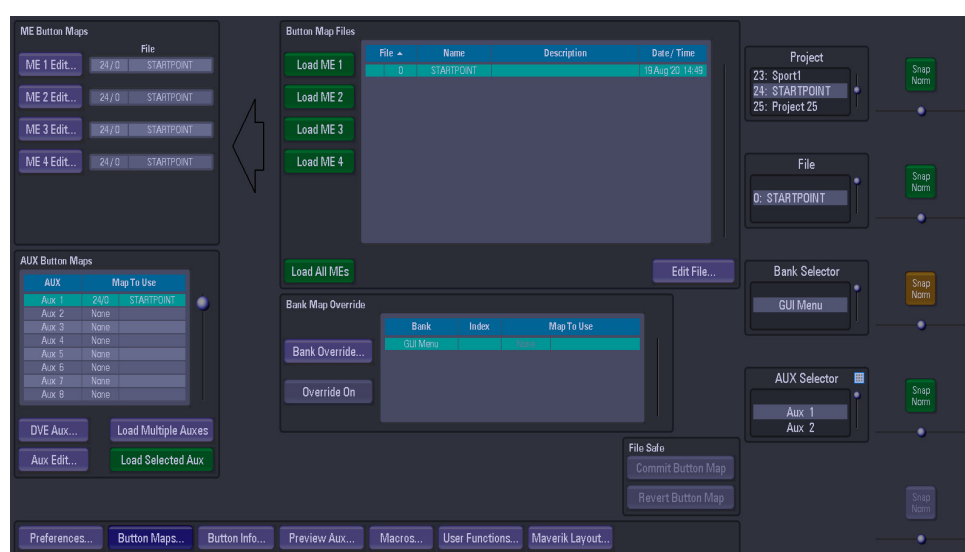
Button Maps Main menu

The main menu allows the user to load a button map from a file, directly to any ME bank (or all) or any combination of Aux Buses. There is also a table showing which physical banks have maps loaded and whether Bank Override is enabled.

Loading a Button Map onto an ME

First, select the required file in the **Button Map Files** table. That file is loaded into the ME by touching the **{Load ME 1}** (for ME1) button, or the **{Load All MEs}** button for all the MEs.

Loading a button map onto an Aux Bank

Once the file is selected in the **Button Map Files** table, it is loaded to a single Aux Bus by selecting the required Bus in the **Aux Button Maps** table and then touching the **{Load Selected Aux}** button. Touching the **{Load Multiple Auxes}** button allows the user to load a map to all, or any combination of Auxes.

Touching the **{Load Multiple Auxes}** button displays the pop-up (shown below) where the you can select the required Auxes.
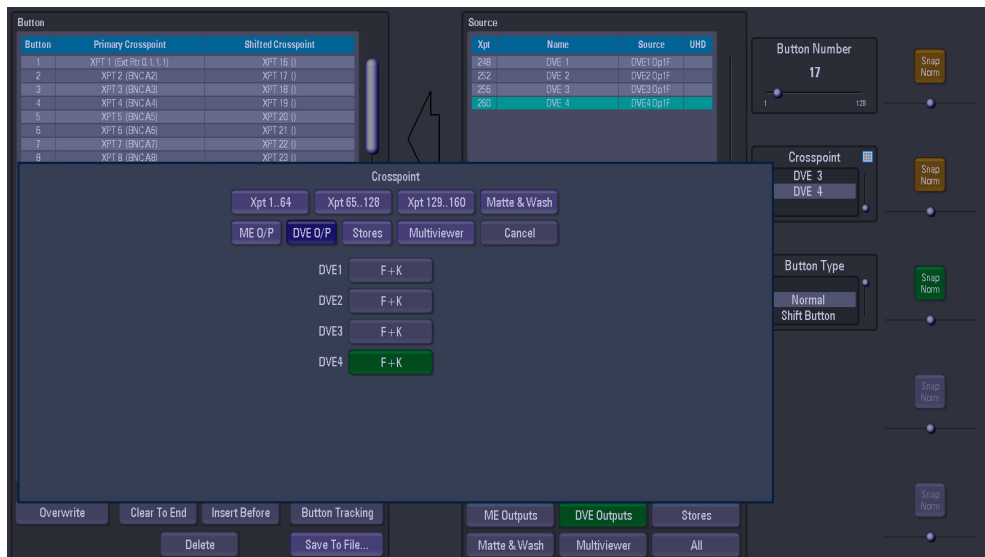
Note: Aux maps are only used in Aux selector panels and are not used when an Aux is selected on an ME bank panel.

Editing a Button Map

Any map can be edited by touching one of the Edit buttons. In the case of ME1, the user touches the **{Edit ME1…}** button. This displays the Edit menu (below) and any changes made on this page will happen in real time on the ME1 buttons.
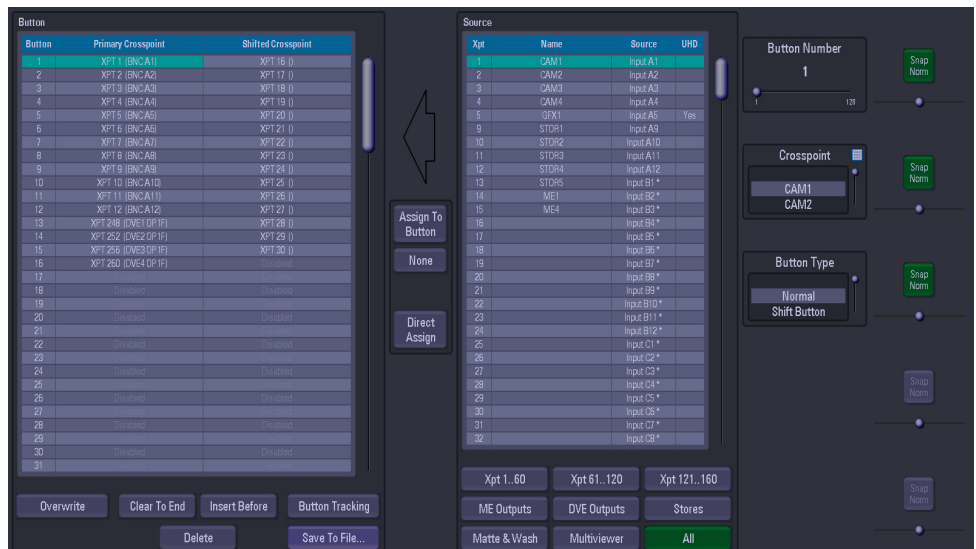
The Button table is split into two columns, on the left are the primary (**unshifted**) button functions and on the right are the shifted button functions. To assign a source to a particular button, the user must highlight the appropriate button on the primary or secondary side then select a source from the source table. The source crosspoints are broken down into separate groups which are selectable on the set of buttons below this table. Touching the **{All}** button selects one complete scrollable list of all the available crosspoints.

Having selected both the button and the source crosspoint, the user then touches the **{Assign to Button}** button to complete the action. At this point both the button table and source table automatically advance one entry - this enables the user to assign consecutive sources quickly.

None - assigns no source to the selected button.

Direct Assign - when this is selected the assignment is made as soon as the source is selected in that table without the user needing to push the assign button. This mode cancels as soon as the user navigates away from that menu.
The **Button Type** selector is used to select the overall function of the bus button and has 3 options: Normal - the button selects the assigned primary and secondary sources.

Shift - The button is now used to select between shift and unshift for the whole bus of buttons. Traditionally this is placed at the far right of the bus.

Bus Lock - pushing this locks the operation of the entire bus. Pushing a second time cancels this.

Clear to End - this clears all buttons beyond the selected button. Note, this will not clear shift or lock buttons.

Insert Before - inserts a blank button and moves all subsequent buttons on one position. Note, shift and lock buttons will not move.

Delete - removes the selected source and moves all subsequent buttons back one position. Note, shift and lock buttons will not move.

Discard Changes - reverts the button map to how it was before the current editing process was begun.

Save to File - the edited map can be saved to a file.

Bank Override

Each physical bank of buttons (ME or Aux selector panel) can have a map forced onto it which overrides any ME or Aux map assignment. This can be useful where button banks are of different lengths, or if an operator wants to control one bus from 2 banks in order to increase the number of sources available.
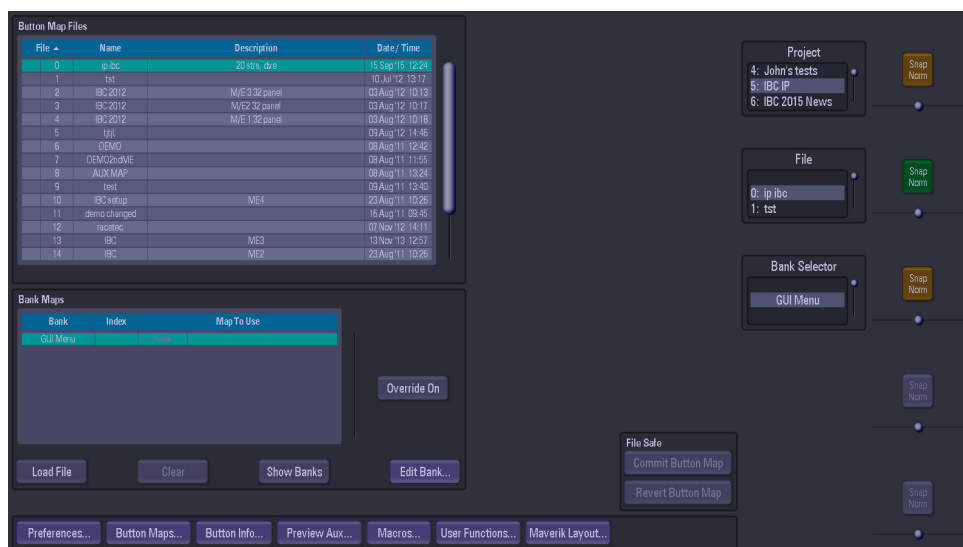
It is important to note that this mode will change the normal operation of a bank. For this reason, the **Override On** control is on the main button maps menu so the user can easily see if this is enabled. Touching the **{Bank Override…}** button takes the user to the Bank Override menu.

The same Button Map files are available in the Files table. All the available banks are listed in the **Bank Maps** table.

To find out what the designation of a particular bank is, the user can touch the **{Show Banks}** button and all the displays on the panel will show their designation.

Override On - enables the Bank Override on the selected bank.

Load Bank - Loads the selected map to the selected Bank.

> Note: The loaded map will not be used unless Override On is active.

Edit Bank - the user can make live edits to the map on the selected bank when override is on.

Button Information

The Panel Config - Button Information main menu displays information about Clone button functions and Macro buttons. The Button Summary table displays all the information related to a selected button.
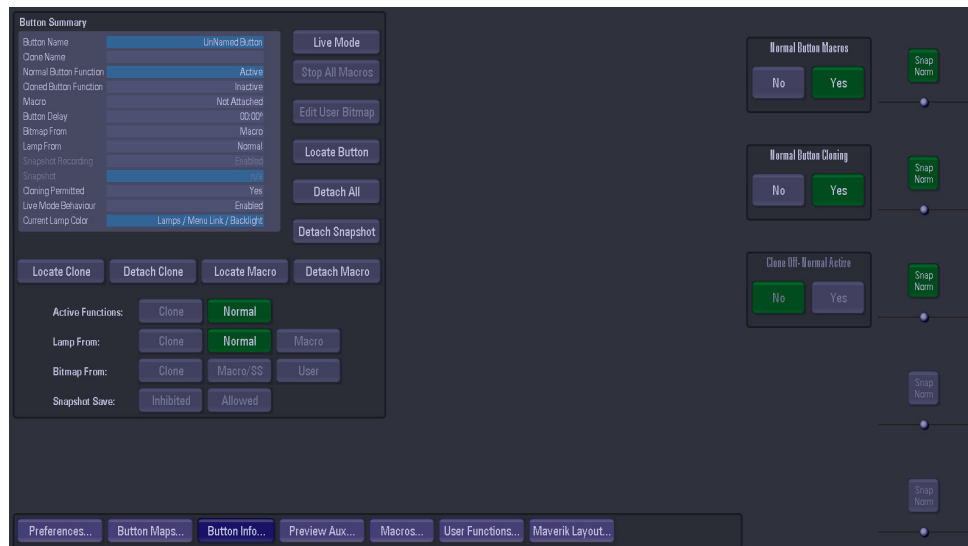
Button Summary

Button Name - the normal button function.

Clone Name - the clone function attached to a button.

Normal Button Function - displays if the normal button function is active.

Cloned Button Function - displays if the cloned button function is active.

Macro - displays if a macro is attached to the button

Button Delay - this displays the delays attached to a macro function

Bitmap From - display where a bitmap is derived from, when cloned to a User Function button

Lamp From - displays lamp from cloned function or from the normal function

Snapshot Recording - inhibits the user function buttons ability to record a snapshot.

Cloning Permitted - if a function can be cloned, this parameter will display Yes

Live Mode Behavior - shows **"Enabled"** if Live Mode can be set on this function.

Current Lamp Color - displays where the lamp color comes from on the copied button.

Button Functions

These buttons are used to locate and disable Clones or Macros associated to a button.

Locate Clone - locates the clone button by turning off all the lamps on all the buttons on the control panel and GUI except the clone button which will turn Red.

Detach Clone - detaches the clone function from a button.

Locate Macro - works in the same way as Locate Clone, and locates a Macro function button

Detach Macro - detaches a macro function from a button

Live Mode - will turn Live Mode On or Off

Stop All Macros - will stop all macros running

Edit User Bitmap - this is a menu link button to bitmap creation menu

Locate Button - this will allow the current function of any button to be summarized in the table. Buttons with Clones and/or Macros attached will light Green when the Locate Button is Active. To locate a button Press the "Locate Button", it will go Red and the panel will only light up Normal Button (e.g. Clones, Macros attachments and Button that have had their Normal Functionality Disabled), the Table will then Display the current Information about that button. The Locate button will then return to Gray.
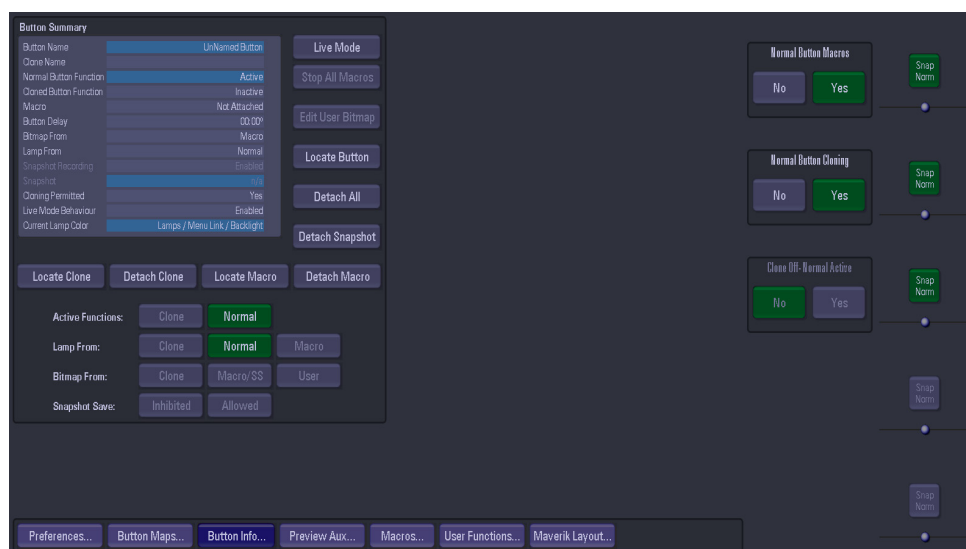
Detach Snapshot - this removes a snapshot from a button.

When a button is selected, this menu can be used to enable/disable functions listed below.

Active Functions

Clone - switches the clone function On/Off

Normal - switches the normal function of a button On/Off.

These can be selected together so that both functions are active.
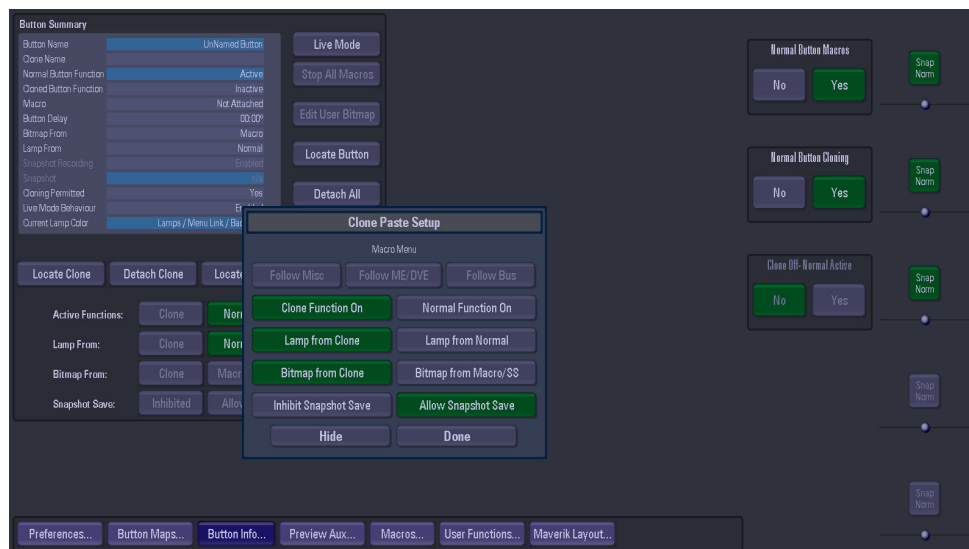
Lamp From

Clone - will set the button lamp to light up the same as the cloned function, i.e. if live to air the button will turn Red.

Normal - switches the lamp between its normal Green color and the Red cloned color

Macro - this will allow a lamp to be lit from a macro assignment

Bitmap From

Clone - displays a bitmap from the cloned function (above left)

Normal - by default, a User Function Button would be blank normally, however this will still allow the clone function to work.

User - displays a bitmap from the User Function, Edit Button Bitmap menu.

Snapshot Save

Inhibited - inhibits the user function buttons ability to record a snapshot.

Allowed - allows a user function button to save a snapshot

Preview Aux

The Preview Aux function is used to setup the Maverik MAV-AUX module. The Switched Source mnemonic emulates the Crosspoint or Button Map setup on the MAV modules on the control surface.
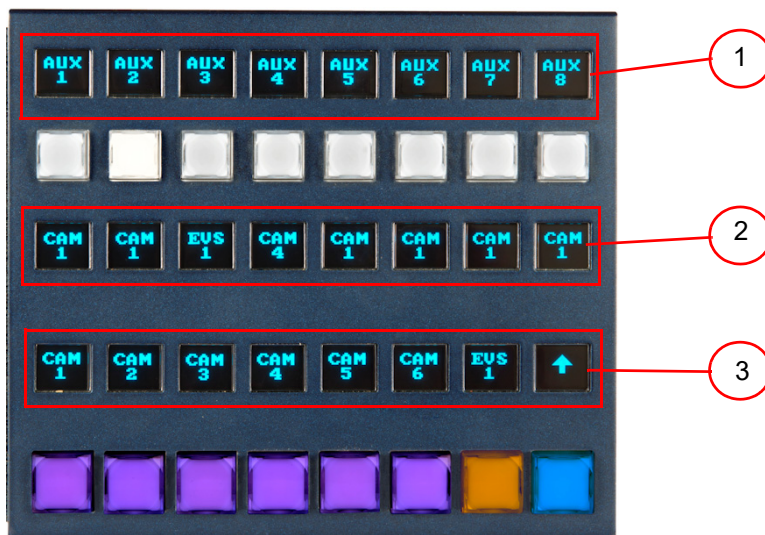
The MAV-AUX modules are enhanced Aux Bus control modules that have three mnemonic displays which give the operator three levels of information:

1. Aux Output Designation - allowing the user to rename the Aux output designation.

2. Current Source to the Aux Output

3. Crosspoint - crosspoint or button map driven sources

Aux Bus setup for Kahuna is done in the **User Config - Aux Bus menu**.
Using the MAV-AUX module is simple, select the required Aux bus using the top row of buttons, then select the source for that Aux Bus using the bottom row of buttons.
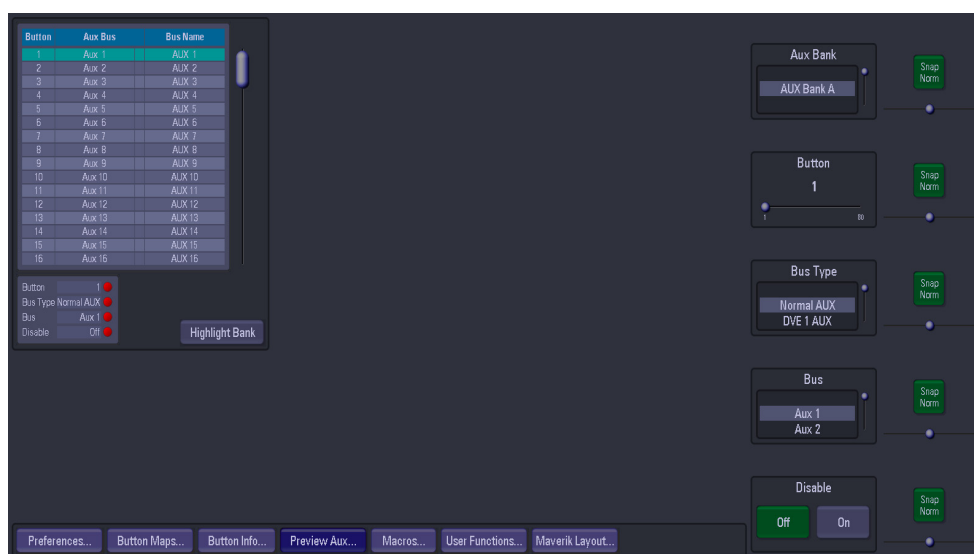
The Aux Bus name can be assigned in the **User Config - Aux Setup** menu.

The Aux Bus Select buttons are numbered starting at 1 on the left of the panel and can have any available Aux Bus assigned to them, using the **Bus** parameter control.

Preview Aux Parameter Controls

Bank - this selects an aux modules. The "Bank" that the aux module sits in is setup in the **User Config - Maverik Layout** menu.

Button - scrolls through the Aux Selection Buttons at the top of the MAV-Aux module.

Bus Type - this sets the Aux Bus to be a normal Aux Bus or a DVE Aux Bus

Bus - this allows the user to select the Aux Bus that will be displayed on that button

Disable - disables the button leaving it blank and inactive.

LCD and LED Aux Panel Setup

Note: The Aux Panels shown below are purchased as an option.

To complement the Kahuna range of control panels, LCD and LED Aux Panels are available to purchase. The Aux Panels can be used for remote Aux output switching.

One panel has 35 LCD buttons and a rotary shaft encoder, the other has 40 LED buttons, 1 LCD button and a rotary shaft encoder.

LCD Aux Panel

LED Aux Panel

Setup and Configuration

Both of the Aux panels connect to the Kahuna mainframe via an RJ45 network cable and have external power supplies.

Rear View (the LCD and LED panels have the same rear)

Network Connector

Power Supply Connectors

Before connecting the panels to the Kahuna mainframe, they have to have their default IP address changed to be within the IP address range of the Kahuna mainframe.
To do this, connect a PC or laptop directly to the Aux panel via a network cable to the RJ45 ports. Set the PC/Laptop IP Address to within the range of the default IP address of the Aux panel which is "**192.168.1.1**" so for example, set the PC/laptop IP address to "**192.168.1.2**".

Once this is done, open a browser window on the PC/laptop and type in the Aux panel IP address and when selected a "**Web Page**" for the Aux panel will open.

In the Web Page window, select "**Production Switcher**", then in the "**System Configuration**" area enter an IP address that is within the range of the Kahuna mainframe and enter Subnet Mask.

For example, if the Kahuna mainframe has an IP address of "**178.162.20.86/19**" then enter an IP address of "**178.162.20.87**" and a Subnet Mask of "**255.255.224**". You can also give the panel an unique name if required.

Finally click on the "**Save**" button. The new IP address and Subnet Mask has been updated on the Aux panel and the Aux panel is ready to use with the Kahuna system.

Note: Change the IP address on the PC/laptop back to its original IP address.

The process of setting up the IP address and Subnet Mask for the LCD and LED Aux panels is the same.

Maverik Layout - Setting Up an Aux Panel

Connect the Aux panel up to one of the network ports on the Kahuna mainframe and connect the power supply.

On the Soft MLC GUI, touch the **{Panel Config}** button, then touch the **{Maverik Layout...}** menu link button.
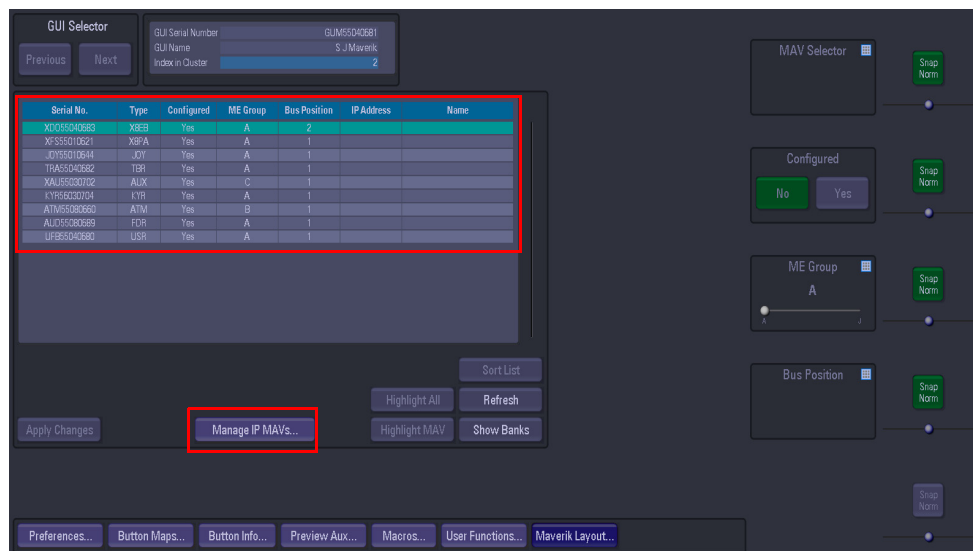
The Maverik Layout menu is used to configure control surfaces and any MAV Modules or ancillary Aux Panels connected to the system. All modules and panels connected are displayed in the table at the top of the menu. At this stage of setting up the Aux panels, they will not be displayed in the table, even though they are connected to the mainframe. The Aux panels will need to be configured before the system recognizes them. To do this, touch the **{Manage IP MAVs...}** button to open the "**IP MAV Setup**" menu.
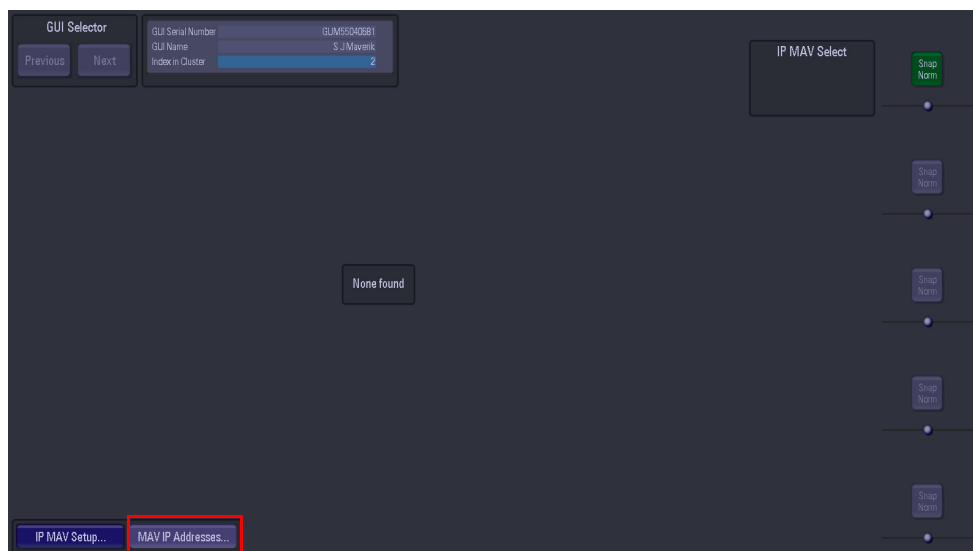
At the bottom of the IP MAV Setup menu, touch the **{MAV IP Addresses}** button to open the "**IP MAV Addresses Configuration**" menu
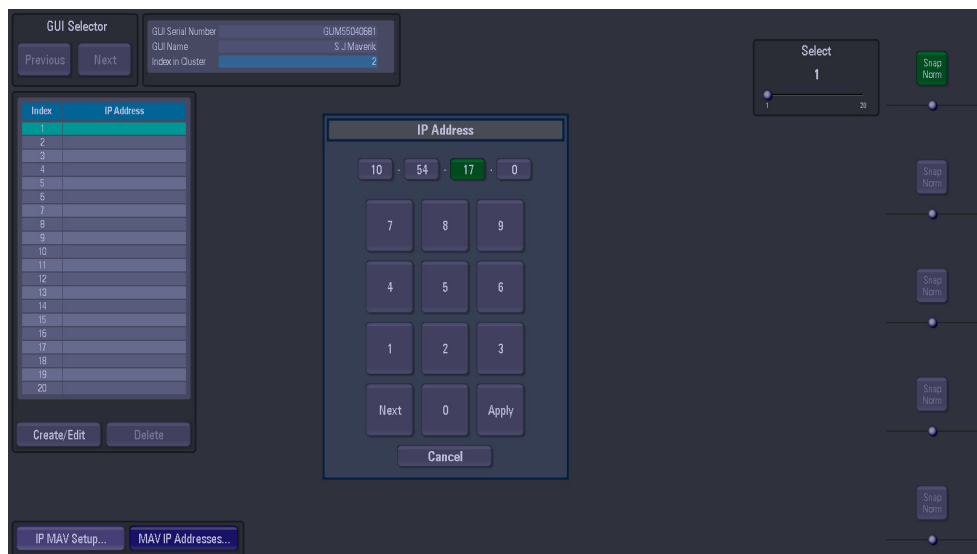
The system has to know the IP address of the Aux panel before it is recognized in the MAV Layout menu. Touch a free slot in the table, then touch the **{Create/Edit}** button and enter the IP address of the Aux panel into the table. Next, you will have to go back to the "**MAV Layout**" menu to configure the Aux panels.
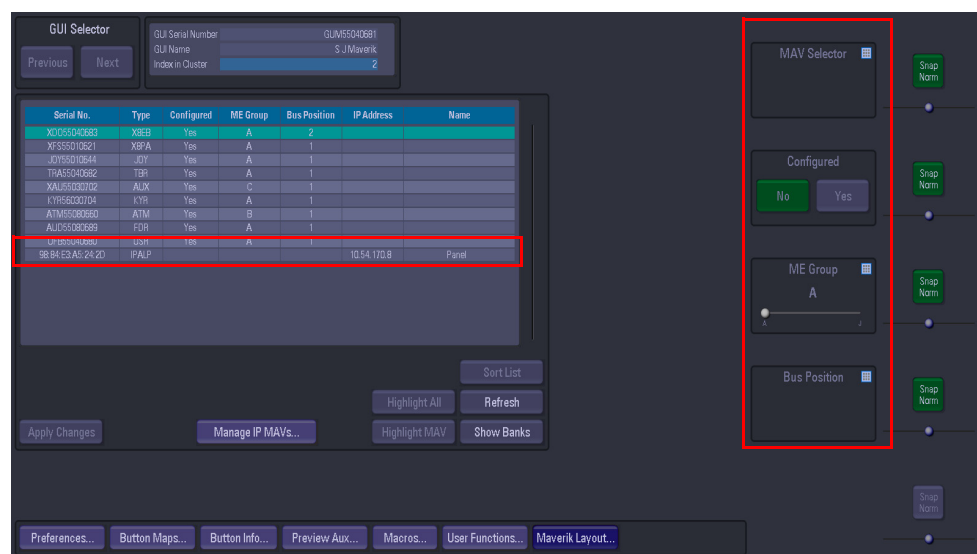
Notice that the Aux panels are now displayed at the bottom of the table. Touch the table row to select the Aux panel and then use the "**ME Group**" and "**Bus Position**" parameters to give the Aux panel a unique ME Group/Bus Position (this has to be different to all other ME Groups/Bus Parameters in the table).
Touch the "Configured" **{Yes}** button and finally **{Apply Changes}**. The Aux panels are now ready to start setting up to use.

Using the LCD and LED Aux Panels

Button Map menus are used to assign button maps for Aux outputs. This allows individual button maps to be assigned to individual Aux outputs.

Once the button maps have been assigned to the Aux outputs, you can call up the Aux output on the Aux panel.

LCD Aux Panel

Rotary Shaft Encoder

Source Selection Buttons

Aux Output Selection Buttons

LED Aux Panel

Rotary Shaft Encoder

Source Selection Buttons

Aux Output Selection Buttons
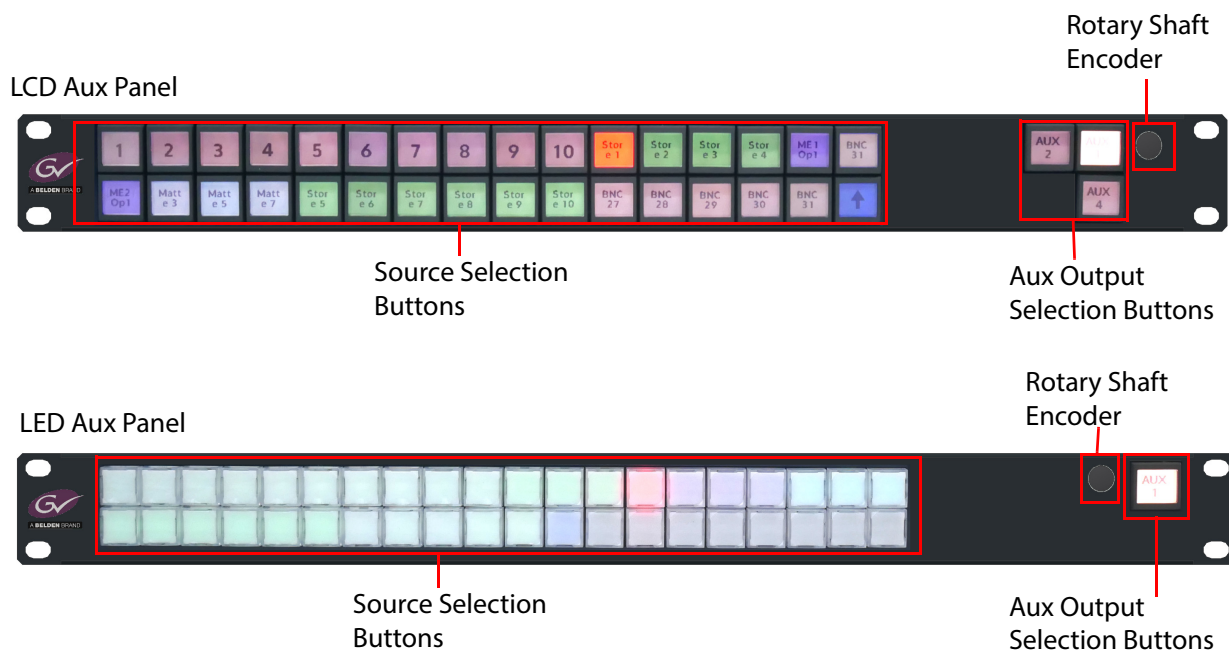
Aux output selection on the LCD and LED Aux panels is done using the rotary shaft encoder and the Aux output selection buttons.

To select and Aux output, press an Aux output selection button and then press the rotary shaft encoder inwards. The Aux output button will go a darker color. Rotate the rotary shaft encoder clock-wise or counter clock-wise to scroll up or down through the Aux outputs and then press the rotary shaft encode inwards to confirm the Aux output selection.

Pressing and holding in an Aux selection button will lock out the button for the selected Aux output. This is confirmed by a "padlock" symbol displayed on the button.

Pressing and holding in the rotary shaft encoder and rotating counter clock wise will display further information about the Aux panel, which includes the:

- IP Mask information
- IP Address information
- Name given to the Aux panel
- PSU1 and PSU2 information

Once an Aux output is selected, the Source Selection buttons will display the button map set for the selected Aux output.

Factory Reset

There are two levels of factory reset:

- First-level Factory Reset:
    - IP address reverts to the default IP address.
    - Note: Serial number is unaffected.
- Full Factory Reset:
    - All stored information on the unit is cleared:
    - IP address reverts to the default IP address.
    - Note: Serial number is unaffected.
    - Settings revert to factory-shipped values.
    - Control panel application is set to 'RollCall'.
    - Software version reverts to the original shipped version.
    - Sets the panel mode to 'RollCall' (as required for router control).

First-level Factory Reset

The sequence of operations is similar for an LCD or an LED panel. In the description below, an LCD panel is shown:

- Using a suitable tool, press on the Factory Reset rear recessed push button and continue to press it.
    - The upper row of buttons in the block of 32 LCD, or 40 LED, front panel push buttons illuminate red one by one from left to right.
    - An LCD button (lower right on an LCD panel, upper right on an LED panel) displays a count down, N, from 15 down to 0.
      "Reset `IP addr in N`"

- Continue pressing the Factory Reset button.
  (If the button is still pressed when the all the upper row of buttons are red and the countdown is at 0, then a first-level factory reset is carried out.)
- Release the button immediately after the last button in the upper row illuminates red.
  (Overall, the button is pressed for approximately 5 seconds.)

Release after all top row illuminates RED.

- The panel now returns to its previous state but with a first level factory reset having been carried out.

Full Factory Reset

The sequence of operations is similar for an LCD or an LED panel. In the description below, an LCD panel is shown:

- Using a suitable tool, press on the Factory Reset rear recessed push button and continue to press it.
  - The upper row of buttons in the block of 32 LCD or 40 LED front panel push buttons illuminate red one by one from left to right.
  - An LCD button (lower right on an LCD panel, upper right on an LED panel) displays a count down, N, from 15 down to 0.
    "Reset `IP addr in N`"

- Continue to press the recessed button.
  - The upper row illuminates white and then lower row of buttons illuminates red from left to right (more slowly).
  - The lower right LCD button displays a count down, N, from 15 down to 0.
    "Full `Factory Reset in N`"

- Continue pressing the Factory Reset button.
- Release the recessed button after the last button in the lower row illuminates red and the count down is at 0.
  (Overall, the button is pressed for approximately 15 seconds.)

Release *after* all bottom row illuminates RED.

A full factory reset is carried out.

- The panel re-boots and the lower right LCD button displays "RE-BOOT".

- A panel start up sequence is then carried out automatically.

Macros

Macros can be assigned to any button on the panel (including Aux panels and some GUI functions). When macros are assigned to the User Function button they can have an associated "bitmap" added to the OLED display on the User Function Button.

Kahuna macros are recorded in real time, this means that macros record functions behind buttons, rather than just the button press. This allows creation of simple multi button operations to complex effects and transitions, which include; Pbus, GPOs, DMEM, and GMEM loading, clip playing and VDCP.

Macros are saved in **Filing System - Macros**, which in-turn are saved into Projects in the Filing System. The buttons functions are assigned within the Panel Config. Although the macros themselves are run and activated in the mainframe the buttons are associated with the Panel Config.

As mentioned earlier, macros are recorded as a sequence of button presses in real time, which in turn are translated into a sequence of actions. The delay between these functions (button presses) can be tested and edited once the recording is completed. Once a macro is running if it is run a second time halfway through the macro run sequence, it will instantly start from the beginning.

User Function Buttons

The **User Function Buttons** on the MAV-UFB and the MAV-AUTO are used for recalling Macro/Clone/SS (snapshot), ME Memory, DVE Memory, Store, GMEM, eKey and ME/DVE Memory. They are also a central point to quickly save and recall "Snapshots" of all available M/E's. This section of the manual describes how to setup and use the user function feature of Kahuna.

MAV-UFBPAD and MAV-AUTO Overview

Before looking at the User Function button setup, it is useful to have an overview of the MAV modules that the user function software is applied to.

MAV-UFBPAD

> Note: The Layout Pages for the MAV-UFBPAD module are user defined and can be setup in the **Panel Config - User Functions** menus.

A User Function Button Pad that allows the user to directly load Macro/Clone/SS (snapshot), ME Memory, DVE Memory, Store, GMEM, eKey and ME/DVE Memory.
The OLED buttons are user defined in the **Panel Config - Macros** menu.

DMEM - press the DMEM button and the OLED buttons display numbers 0 - 9 and a "/" (forward slash), OLED button - bottom right displays the current M/E.
Hold down the DMEM button and the available M/Es are displayed in the OLED buttons.
Loading a DMEM - Hold down the DMEM button and select which M/E the DMEM is to load into (or press **{Current ME}** bottom left). Then use the number pad to enter the Project number, then press "/" and enter the File number, finally press the OLED button "bottom right" to select. Example: M/E3 - 12 (project) / 05 (file) - Press OLED button to select.

The same procedure as above will apply when loading a DVE or Store.
GMEMs are slightly different, the user does not have to enter the M/E as GMEM's are global and will affect the whole control surface.

Macro - the macro User Function Buttons are setup and programmed by the user, so are empty until macros are loaded into them.

Each of the 4 Macro buttons has ten pages of layouts and each layout can have 10 macros attached to them, so, a MAV-UFBPAD can hold 400 macros.

To access a macro, hold down a [Macro] button, then select a "Layout" using one of the OLED buttons. Then select a macro using the OLED buttons.

MAV-AUTO

Page Selection Buttons

Page Mnemonics

Layout Selection Buttons
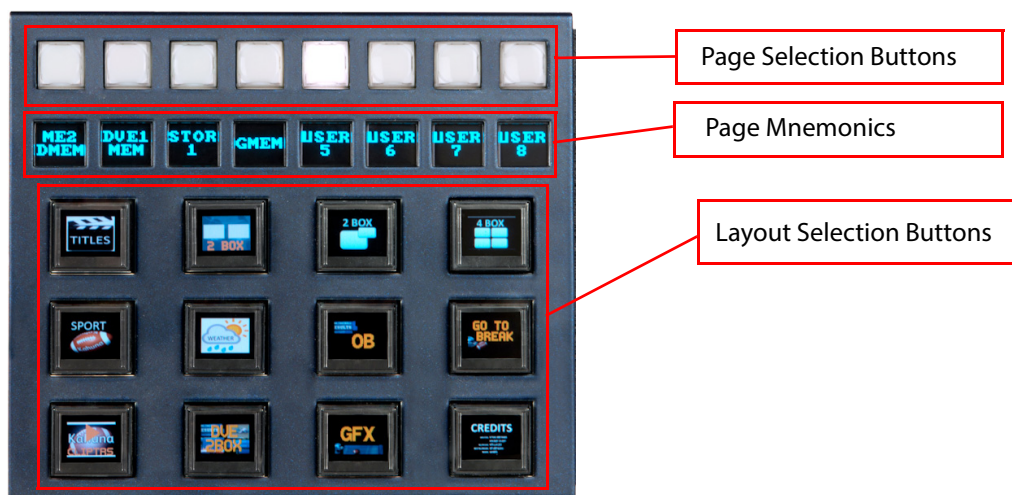
Note: The Layout Pages for the MAV-AUTO module are user defined and can be setup in the **Panel Config - User Functions** menus.

The Automation module that allows the user to directly load Macro/Clone/SS (snapshot), ME Memory, DVE Memory, Store, GMEM, eKey and ME/DVE Memory.

The OLED buttons are user defined in the **Panel Config - Macros** menu.

DMEM - press the DMEM button and the OLED buttons display numbers 0 - 9 and a "/" (forward slash), OLED button - bottom right displays the current M/E.

Hold down the DMEM button and the available M/Es are displayed in the OLED buttons.

Loading a DMEM - Hold down the DMEM button and select which M/E the DMEM is to load into, (or press **{Current ME}** bottom left). Then use the number pad to enter the Project number, then press "/" and enter the File number, finally press the OLED button "bottom right" to select.

Example: M/E3 - 12 (project) / 05 (file) - Press OLED button to select.

The same procedure as above will apply when loading a DVE or Store.

GMEMs are slightly different, the user does not have to enter the M/E as GMEM's are global and will affect the whole control surface.

Macro/User Function Buttons - the macro User Function Buttons are setup and programmed by the user, so are empty until macros are loaded into them.

Each of the 4 Macro buttons has ten pages of layouts and each layout can have 10 macros attached to them, so, a MAV-UFBPAD can hold 400 macros.

To access a macro, hold down a **[USER]** button, then select a "Layout" using one of the OLED buttons. Then select a macro using the OLED buttons.

Snapshot Function

In the **Panel Config - Panel Preferences** menu (shown below) a snapshot is automatically saved into the Default SnapShot Project 99, but the user can save a SnapShot into a user defined Project, use the **Project** parameter to select where the snapshot will be saved.
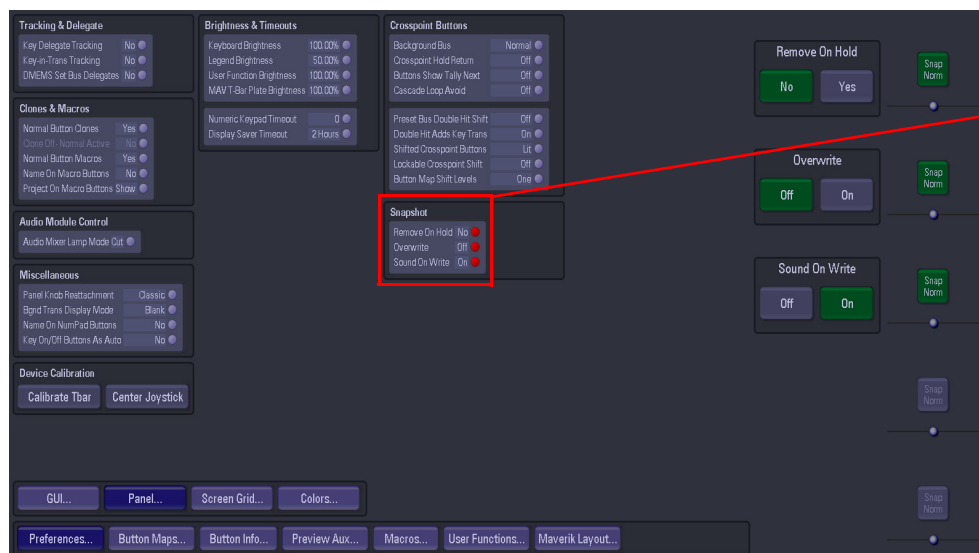
SnapShots
Auto saved into
Project 99
But can be saved
into any Project

Select "User 1 - 8" or select "**Macro**" on the MAV-AUTO/MAV-UFBPAD, the hold down any of the User Function buttons for a couple of seconds and an audible "**bleep**" can be heard, this action will then take an instant "**Snapshot**" of the current M/E, the User Function button will display "**Snapshot (number)**" the number is incremental and related to the Bank register.
Pressing the Snap Shot button a second time will give a one button "**Auto Recall**" of the saved snapshot.

There are two ways to remove a snapshot from a user function button. The first is to set the "**Snapshot - Remove On Hold**" to "**Yes**" in the "**Panel Config - Panel Preferences**" menu.
The other is to use the "**Clear Macro/SS**" button in the "**User Function - Details**" menu.
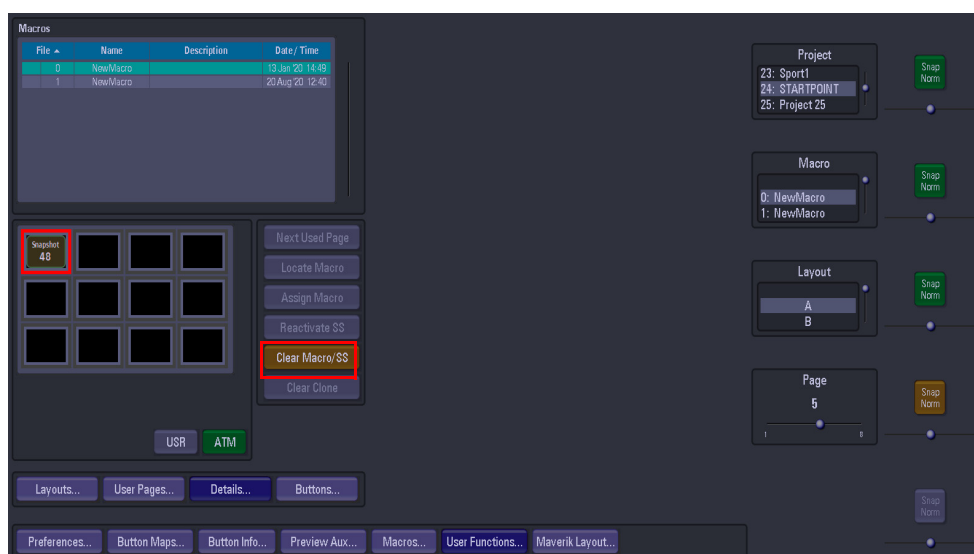
Layouts

On entering the **Panel Config - User Function** menus, the first menu that will be displayed will be the "**Pages**" menu, but it is a good idea to go to the "**Layouts**" menu first, to setup the "**Active Layouts**" before assigning functionality to the user function buttons. Press the **{Layouts...}** button to display the **Panel Config - User Function Layouts** menu.
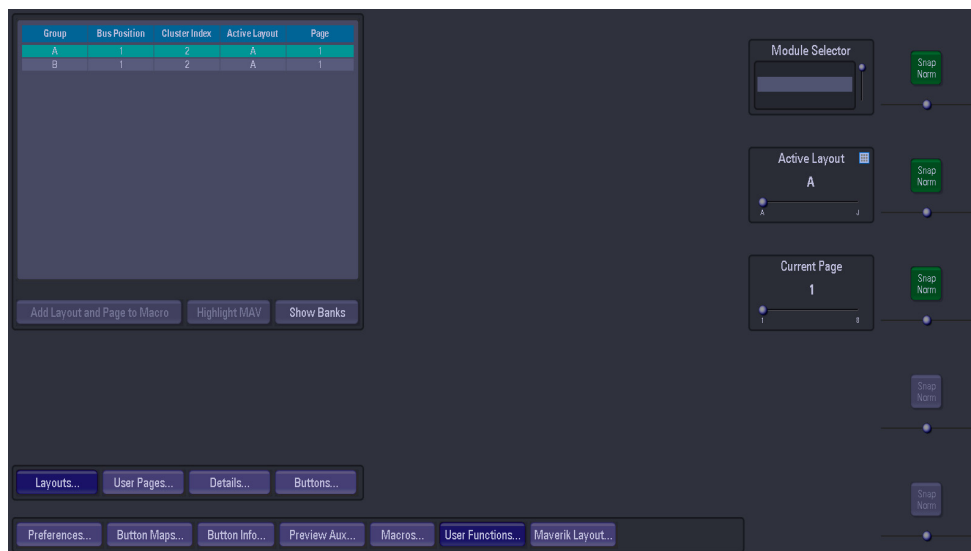
Parameter Controls and Table

Group - this refers to the **M/E Group** that the MAV-AUTO/MAV-UFBPAD were set to in the **Panel Config - Maverik Layout** menu, (shown above are 2 MAV modules that have been set to M/E Group A and B).

Bus Position - this refers to the bus position given to the MAV module in the Maverik Layout menu when setting the Maverik control surface up.

Active Layout - these are the layouts given to each individual MAV module, so that they can be given individual **Page** and **Button** layouts. Up to 10 different active layouts (A - J) are available. If MAV modules require the same layout, then the Active Layout letter should remain the same for each MAV module, if all need MAV modules need to have different layouts, then all should be given a different Active Layout letter.

Module Selector - this parameter scrolls through the list of MAV modules in the table

When pressed, the **{Show Groups}** action button will make the **User Function buttons** on each MAV module display which Group they are attached to.

User Pages

This is the firs menu that will appear when entering the **User Function** menus. Here, MAV-AUTO/MAV-UFBPAFD Pages and Buttons are setup as a user defined layout and the Page bitmap graphics can be changed if required.

Function select buttons on the MAV-UFBPAD and MAV-AUTO and Mnemonic display

Virtual Buttons emulating the MAV module buttons
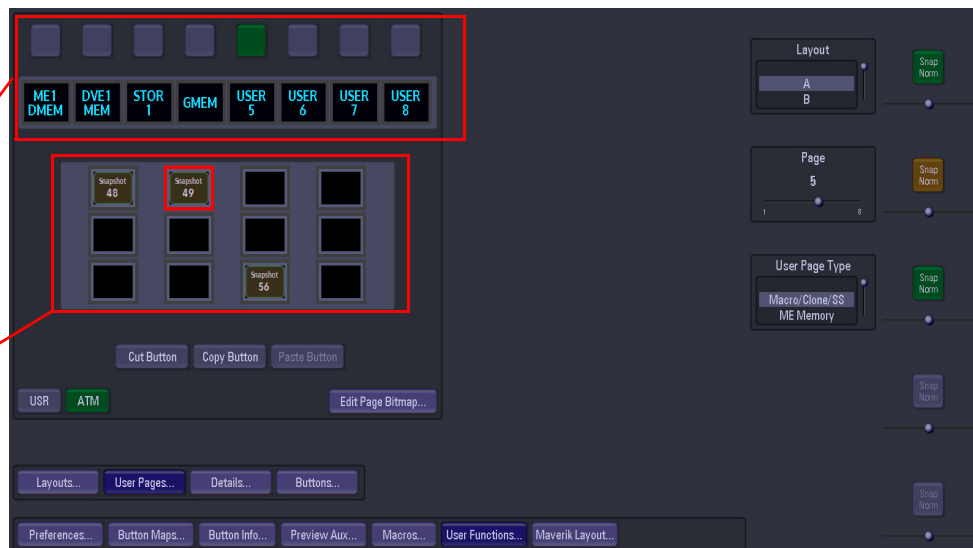
Layout - this parameter scrolls through the **Active Layouts** that were assigned to the MAV modules in the "**Layouts**" menu. When scrolling through, the Pages and Buttons layouts in the menu will change to reflect the layout on each MAV module.

Page - this parameter will scroll through each of the Page buttons in the "Page" area of the menu.
A Page buttons layout changes on an individual button by button basis, depending on the selected "Page Type" function assigned to each page button, or what may have been assigned from the "Edit Page Bitmap" menu.
Touch a page button to select it, or use the "Page" parameter to scroll through the buttons. The page button will turn brown.

The Page button display (in the menu above), displays the page button layout for each active layout, for each MAV module.
For the MAV-AUTO module, the text on the page button in the menu reflects what is seen in the mnemonic displays on the MAV module.
For the MAV-UFBPAD module, the page button layout will reflect by default the layout of the small white function buttons at the top of the module.

User Page Type - this parameter scrolls through the list of Button Functions that can be assigned to each Page button.There are 8 Page (function buttons) and 12 User Function Buttons on each MAV module, giving the user up to 96 individual programmable OLED buttons to select, or 7 different Page Type Layouts per Page function button.

Buttons - this button grid displays the User function buttons that emulate the OLED buttons on the MAV module. Button layouts will change depending on the Page Type selected.

> Note: Macros that have OLED button images can only be associated with a macro in the "Macro - Bitmap" menu. The same applies to user defined text created for OLED buttons.

Page Type Parameter (continued)
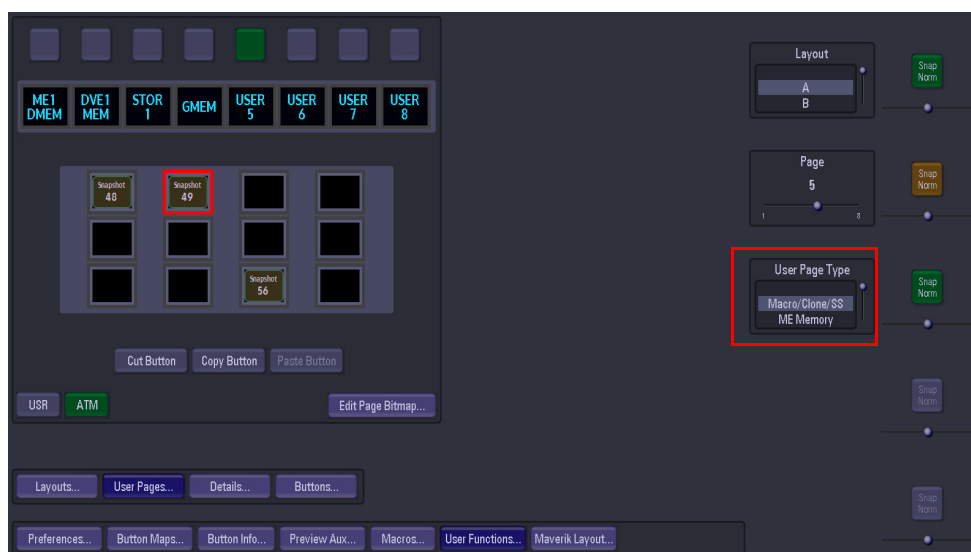
> Note: Re-calling DMEMs, DVEMEMS, GMEMs etc. is explained at the start of this section (User Function).

Macro/Clone/SS (Snapshot) - this will display all Macros, Cloned buttons or Snapshots applied to each Button.

ME Memory (DMEM) - this will set the selected OLED Button layout as a numeric keypad so that DMEMs can be re-called.

DVE Memory- this will set the selected OLED Button layout as a numeric keypad so that DVE setups can be re-called.

Store - this will set the selected OLED Button layout as a numeric keypad so that a Still or a Clip can be re-called.

GMEM - this will set the selected OLED Button layout as a numeric keypad so that a GMEM can be re-called.

eKey - this turns the OLED buttons into M/E eKey "Cut", "Auto" and "Time" for the available eKeys for each M/E.

ME/DVE Memory - this will set the selected OLED Button layout as a numeric keypad so that ME/DVE memories can be re-called.

{ATM Button Layout} - this change the User function button layout in the menu to emulate the OLED buttons on the MAV-AUTO module and the MAV-UFBPAD module.

The **{Edit Page Bitmap...}** menu link button will enter the User Function Page Bitmap menu. The menu allows the user to apply a simple image or text to a Page button.

> Note: The change of text or image in the "Edit Page Bitmap" menu can only be displayed in the mnemonic displays on a MAV-AUTO module.

Edit Page Bitmap

This menu allows the user to attach a user defined bitmap or text to a Page button.The bitmap text can be typed in using the on-screen keyboard, or a bitmap image created or chosen from a selection of preset bitmaps from a library.
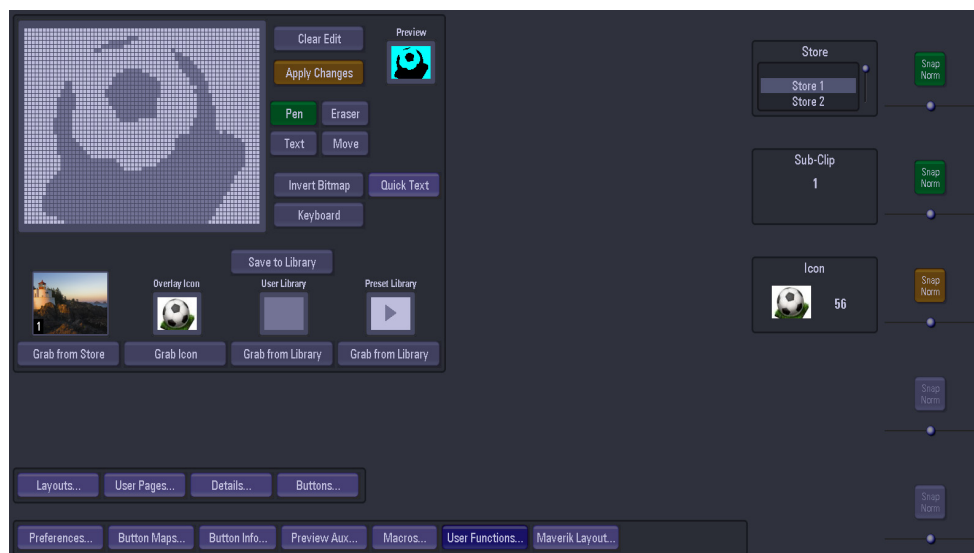
Selecting from the Preset Library

Rotate the **Preset Library** parameter, notice that the bitmap images in the Preset Library window change. Once happy with the bitmap, press **{Grab from Library}** and the bitmap will be displayed in the bitmap grid. This option is the same for the User Library.

Creating a Bitmap

If the user decides to create a bitmap, the bitmap can be drawn or typed into the bitmap grid area, and then saved to the **User Library**. To hand draw a bitmap, select **Pen** in the **Draw Mode** parameter, and then select the **Brush Size**. Create the bitmap in the grid area, if a mistake is made, select **Eraser** and erase the mistake out in the grid.
Once happy with the bitmap, press **{Save to Library}** and the bitmap will be saved to the User Library, up to 50 bitmaps can be stored and recalled.

Entering Text

Touch the **{Text}** button, then use the "**Font**" parameter to select the required font size. Notice that there is a "**light Blue**" square in the grid area, this is where the first letter will appear when you start typing. Touch the light blue square and slide the tip of your finger over the grid to the position where you want the first letter to appear.
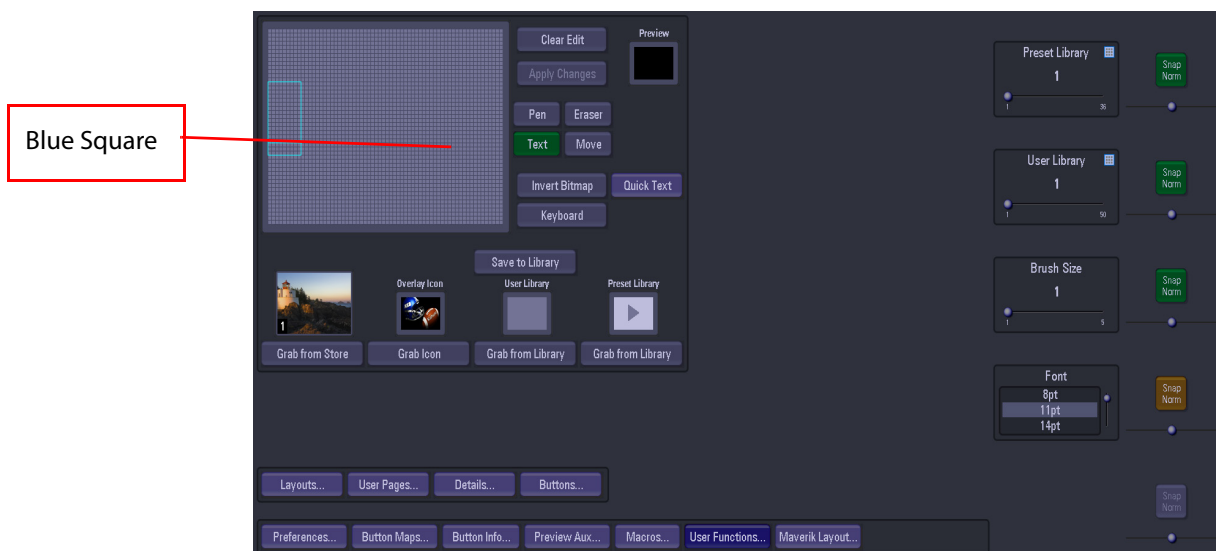
Touch the **{Keyboard}** button and an on-screen keyboard will appear, then type the text on the keyboard. When finished press the **{Enter}** button on the keyboard.
Text can also be saved into the **User Library** by touching the **{Save to Library}**.
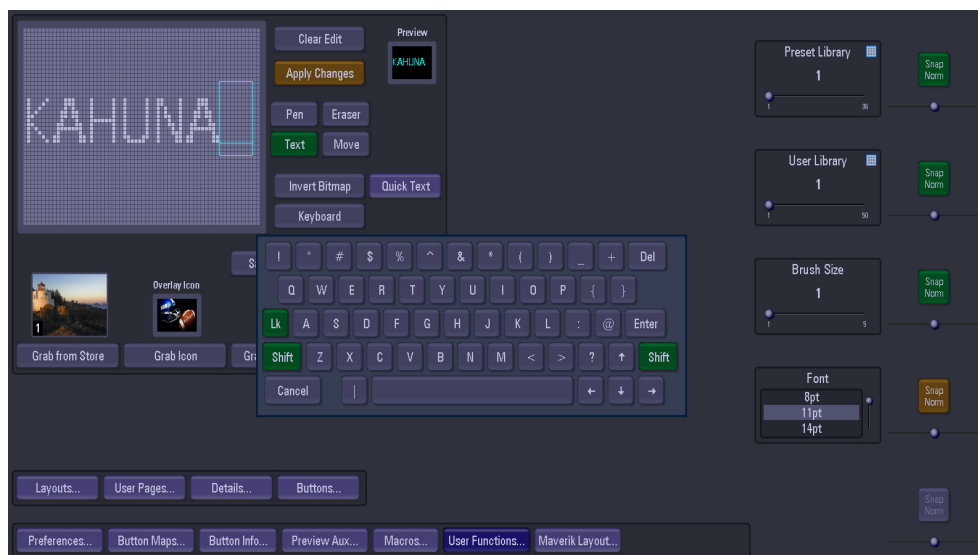
You can move the text to a different position on the grid by touching the **{Move}** button and then touch the text with your finger and slide your finger across the grid until the text is in the required position.

Quick Text

Entering text into the bitmap grid can take a little time to get the text into the correct position with the right font size. The "**Quick Text**" menu allows you to quickly place text into the gray bitmap square and whilst typing, the text automatically size itself within the boundaries of the bitmap grid.

Touch the **{Quick Text}** button and the "**Quick Text**" menu will be displayed. Turn the "Auto Font Size" parameter to "On" and then start typing the text with the on-screen keyboard.

As more text characters are added the font will auto size itself the size of the quick text box grid. Text can also be aligned more accurately using the "Alignment" buttons.

After finishing entering the text, touch the **{Apply}** button.

Details

This menu displays all the information related to user function buttons on all the different Pages, Layouts, Macros, Snapshots etc. that have been assigned to the User Function buttons.
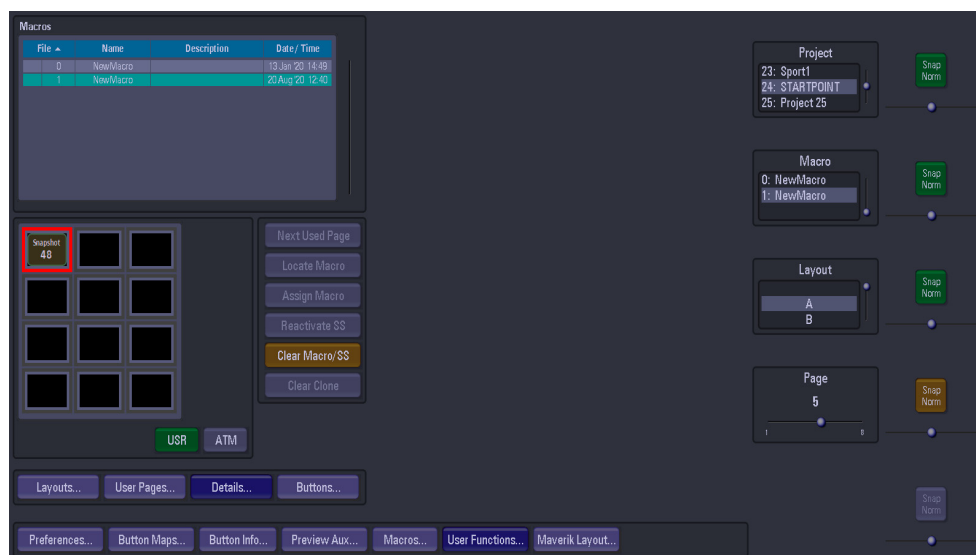
Parameter Controls

Project - allows the user to select the project containing macros. The individual macros will then be displayed in the Macros table (shown in the menu above).

Macro - this selects an individual macro in the table, highlighted by the light blue bar.

Layout - this scrolls through the available Active Layouts.

Page - this selects one of the 8 available pages Layouts with the macros can be attached to.

{ATM Button Layout} - this change the User function button layout in the menu to emulate the OLED buttons on the MAV-AUTO module and the MAV-UFBPAD module.

Details Buttons

Locate Macro - this will locate a macro from any project, when attached to a user function button. If a macro is attached to a user function button, touch the button in the menu to high it then press the **{Locate Macro}** button and the macro will be highlighted in the macro list at the top of the menu.

Assign Macro - this assigns macros to user function buttons. Touch an empty user function button in the menu, then select a macro from the table and press {Assign Macro}, the macro and any associated bitmap image is now attached to the user function button.

Reactivate SS - if a macro is cleared from a user function button by accident, the Reactivate SS will restore the macro to the button.

> Note: This is an immediate restore of a snapshot, and will only restore
> snapshots that have just been cleared from a user function button.

Clear Macro/Snapshot - will clear the macro or snapshot function from the table and Button.

Clear Clone - will clear the clone function from the table and Button.

Buttons

This menu is used to locate a button/page /layout where a macro clone or snapshot is currently attached and allows the user to clear the macro, clone or snapshot from the list.
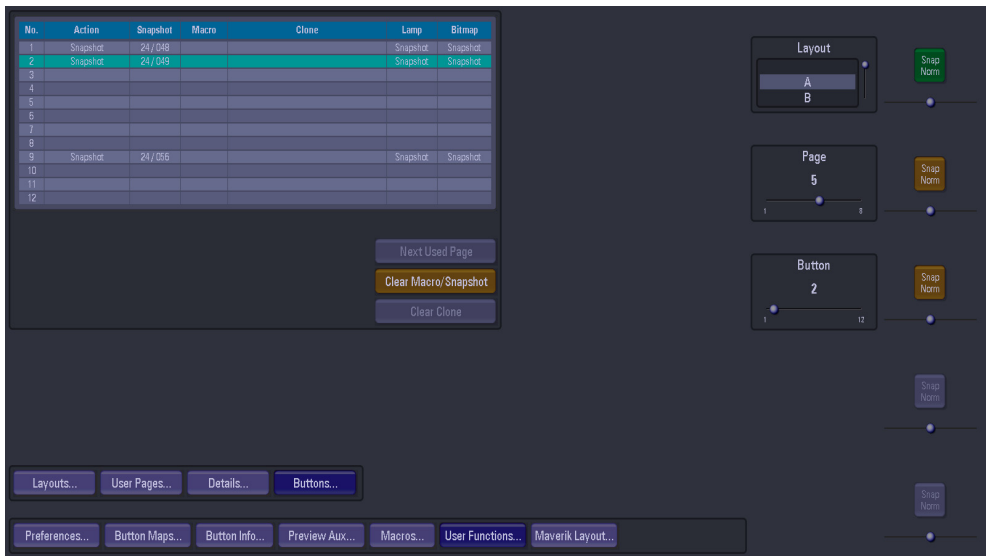
Table:

No. - user function button number 1 to 12

Action - displays the action attached to the user function button, Macro, Snapshot, Page Select GMEM etc.

S/Shot - displays the project and snapshot file number

Macro - displays the project and macro file number

Clone - displays the cloned function

Lamp - displays the type of lamp that will light the user function button. The user function button lamp default settings means the button lamp will be lit according to the button cloned/macro assigned or snapshot. The user is also able to assign a button color from a preset selection; using the **Lamp Mode** parameter. Select an action, then select a color. The selected lamp color is displayed in the **Lamp** column.

Bitmap - displays where the bitmap is taken from

Buttons:

Clear Macro/Snapshot - will clear the macro or snapshot function from the table and Button.

Clear Clone - will clear the clone function from the table and Button.

Maverik Layout (for the setup of the Maverik control surface)

Once the MAV-GUI and the GUI have logged in to the mainframe, the MAV-GUI or MAV-GUIs have to know where the MAV modules are positioned within the control surface, so that for example, the crosspoint MAV module buses are setup correctly.

Press the **[PANEL CONFIG]** button on the GUI, then in the Panel config menu, press the **{Maverik Layout}** button.

The **Panel Config** - Maverik Module Layout menu allows the user to setup the layout of the Kahuna Maverik control surface.

The table displays all the MAV modules that are physically connected to the MAV-GUI that is currently selected. The "GUI Serial Number" box under the main table shows the user which GUI is currently selected, this can also be confirmed by pressing the **{Highlight MAV}** button. This becomes useful when there are multiple MAV-GUIs in a control surface.

It is vital to set the layout of MAV Xpt modules correctly to make sure that the crosspoints run in the correct numbered sequence.

To do this, use the **MAV Selector** parameter to scroll through the table and select the first MAV Xpt module (the first MAV Xpt module on the left side of the control surface), again, this can be confirmed by pressing the **{Highlight MAV}** button. Then, using the **BUS Position** parameter, give the MAV module the number "1", use the **ME Group** parameter to place the module in an **ME Group** (e.g. A) and finally, press **Configured {Yes}**.
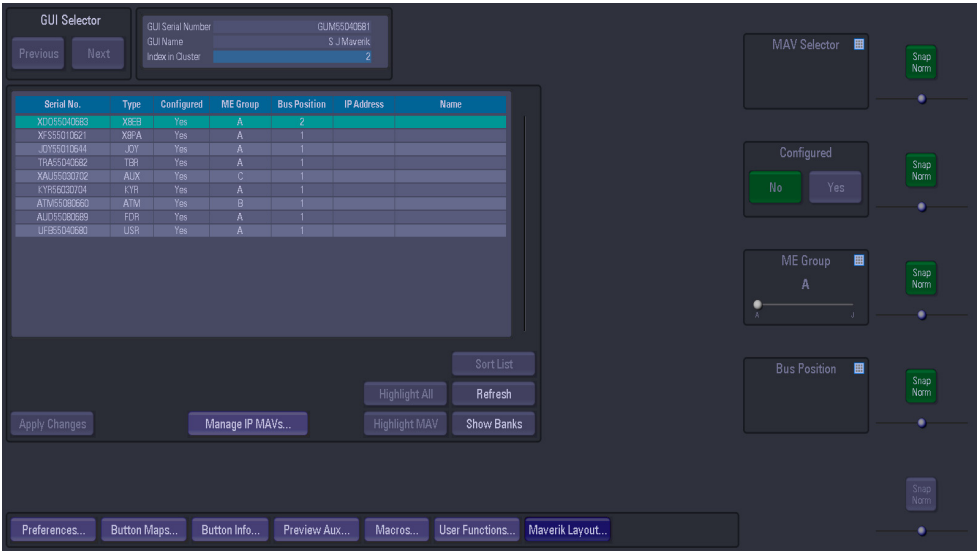
The above steps are repeated for the MAV Xpt module to the right of the first one, giving the module a **Bus Position** of 2, and so on for all the MAV Xpt modules and the other modules.

If there is a second MAV-GUI in the control surface, press the **GUI Selector {Next}** button and then the "GUI Serial Number" box under the main table will display the second MAV-GUI and the table will display all the MAV modules connected.

Example of Maverik Module Layout
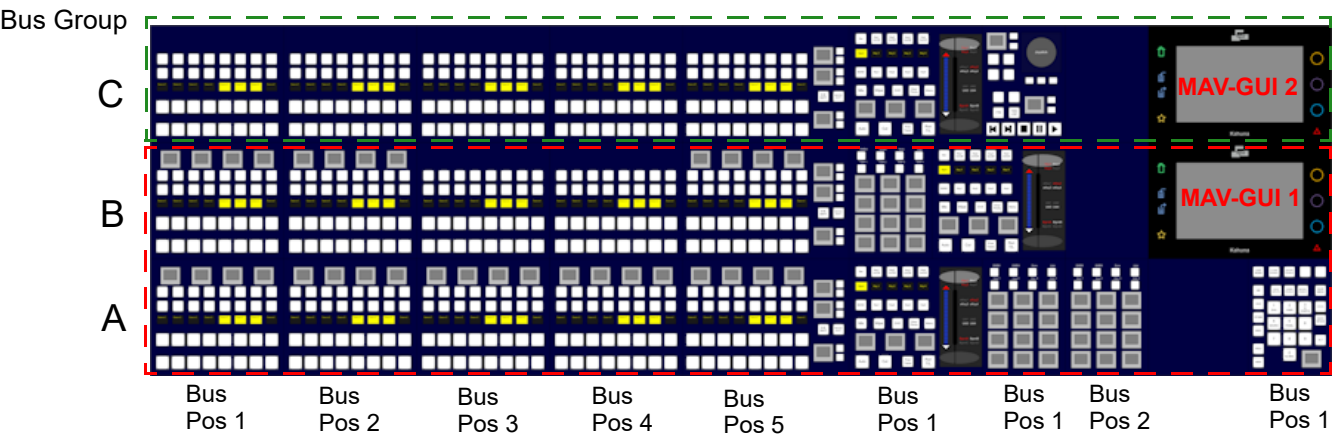
The example above displays a Maverik Module Layout where all the MAV modules in **Bus Group A/B** are connected to **MAV-GUI 1** and the all the MAV modules in **Bus Group C** are connected to **MAV-GUI 2**.
Bus Group A shows the correct **Bus Position** numbering for the MAV Xpt modules, the MAV Tbar module, MAV UFB modules and the MAV Number Pad.
Once the **Maverik Module Layout** has been configured for the whole control surface, press the **{Save Changes}** button to save the layout.

> Note: If any MAV Xpt modules are removed or their position changed and the system is re-booted the module layout will be lost.

I/O Configuration

I/O Config Overview

Input Output Config The I/O Config menu saves and loads By Bus and By Crosspoint setup files.

File Table

Current Selected Project

Current Selected File
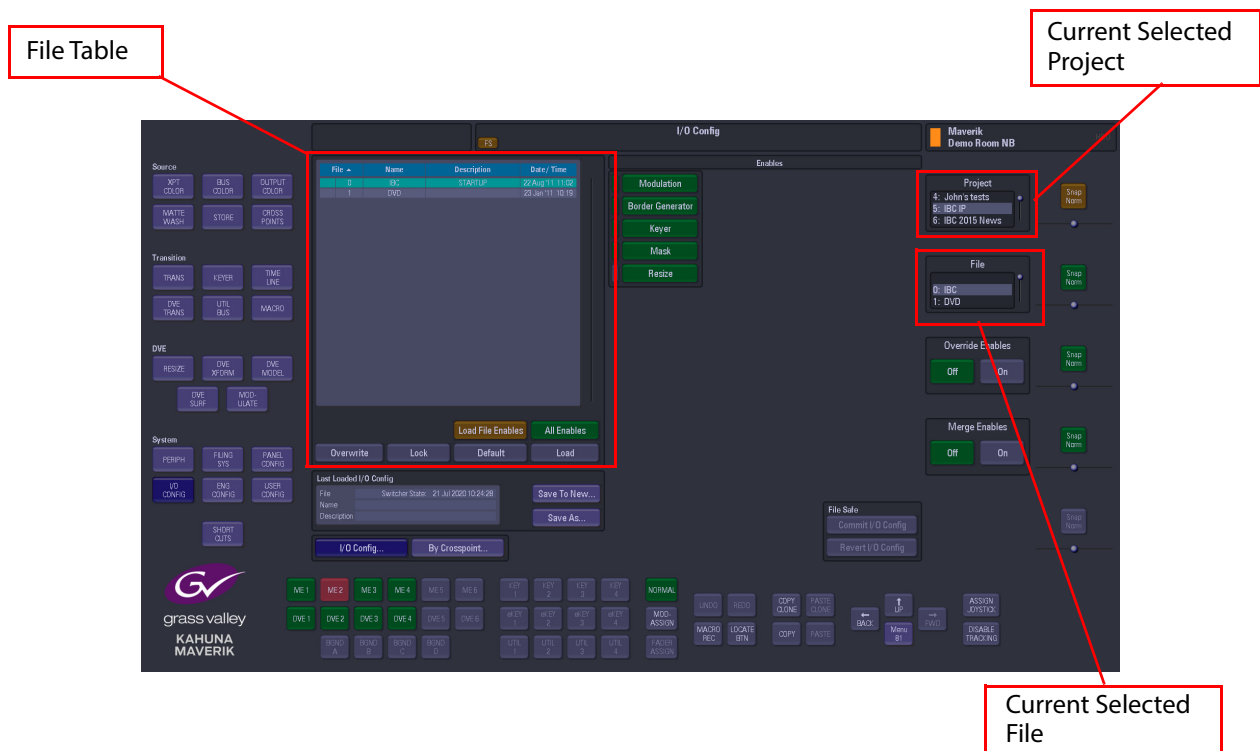
Input Output Config files are saved within projects, up to 1000 (0 to 999) user specific input/output config files can be saved within each project. The saved file can be used in the system startup file, along with the other main configs.
The table in the menu displays files in the currently selected project, the user is able to scroll through the files and load as necessary.

> Note: The following functions accessibility will depend on the access rights of the user, Engineer and Power Users only.

The **{Overwrite}** button will overwrite the currently selected file, once pressed, a caution dialog box will appear, asking the user if the file is to be overwritten.

{Make Default} action button will make the selected configuration (marked by a star symbol next to the file number, shown below) into the default for the I/O Config startup, press the {Default} button a second time to disable the default setting.

The **{Lock}** action button will lock a selected file and will not allow that file to be changed until unlocked. Select the required file and press the **{Lock}** button, a padlock symbol will then appear in the far-left column. To unlock, press the **{Lock}** button once more.
Load - will load the current enables configuration into a selected file in the main I/O Config menu table.

The **{Enables...}** button accesses a menu that enables/disables certain functions that are related to the I/O Config when the file is saved, such as Modulation, Border Gen and Keyer. The was that enables are selected/de-selected will also affect a DMEM or GMEM when saved. The small green tab next to the function enable button will display if a function has been saved with a panel config file or not. If the tab is gray, the function next to it is not included in that saved panel config file. De-selecting an enable will mean the function will NOT be included when saving the I/O Config and subsequently; NO change will be applied to that function when loading that file.
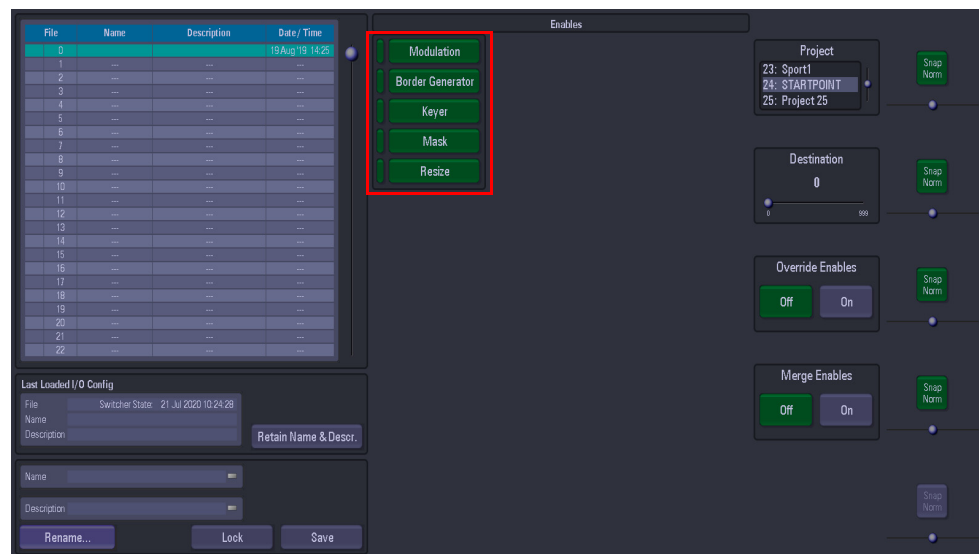
Override Enables - will override any enables that have been de-selected and turn the enable on
Merge Enables - When loading a DMEM, the state of the enables in the M/E that you are loading into is replaced by the state of the enables in the file you are loading.
This means that if any parameters change, and then re-saved the DMEM, it would retain its original enables. It also means (for example) that the key-layer timeline that previously worked but whose enable is off in that DMEM will now stop working, as it's enable is now off. However, if Merge Enables is on when the DMEM is recalled, the enables that end up in the M/E are a merging (logical OR) of the enables in the file and the enables already set in the M/E. Merge Enables also works on GMEM loads.

Save - will open the Save As menu, so that the user can save the enable into a selected or new Config.

Saving a new I/O Config file

Press the **{Save As…}** button to enter the **I/O Config - Save As** menu, and the I/O Config - Save As menu will appear. User the Destination parameter to select a new destination in the table. Use the Current I/O Config attacher to name the new file, and them press **{Save}**.
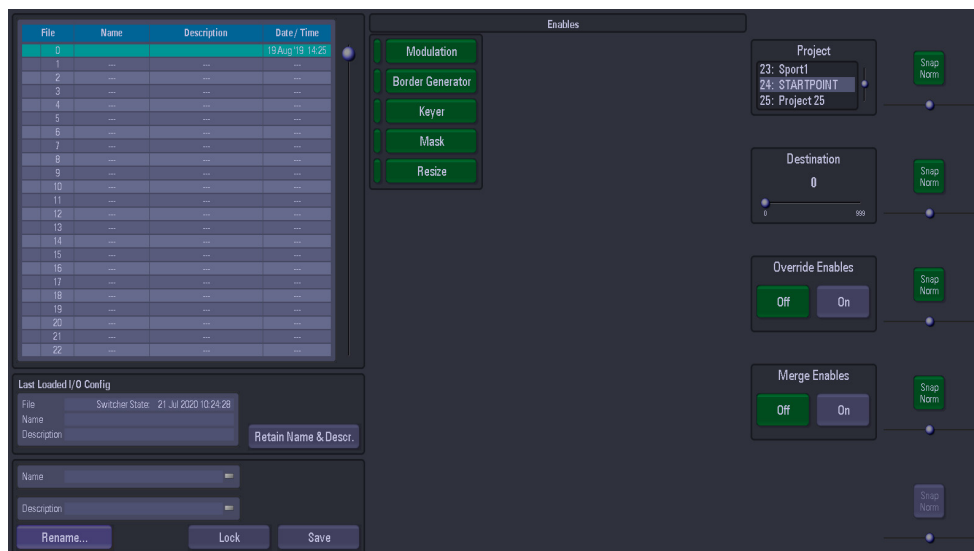
The new file will then be saved in the table and the GUI will go back to the I/O Config main menu screen.

> Note: The I/O Config menu can also be accessed through the **[FILING SYS]** menu.

By Bus/By Crosspoint Setup

This menu allows Keyer, Masks, Border and Resize adjustments to affect individual Crosspoints or apply adjustments to a whole bus.
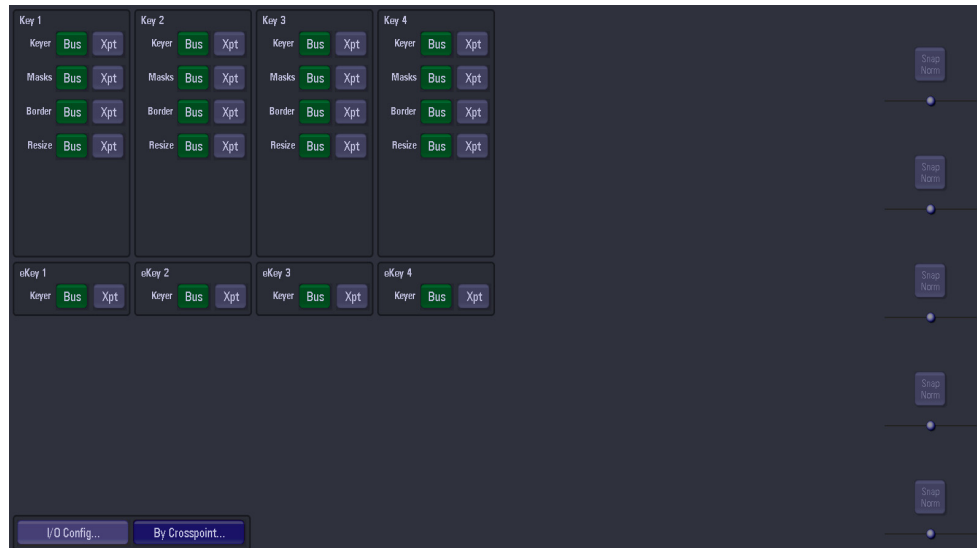
Use the buttons to select or de-select **{Bus}** or **{Xpt}** operation.

Example: Key 1, Keyer Xpt will mean that each time a particular Xpt is selected on the Key layer in question and in the its Key Control settings, Lin and Coupled are selected for example, they will be remembered and automatically selected next time the Keyer Xpt is selected.

Filing System

Filing System Overview

The filing system is as it suggests a menu where all the Projects, Configs, DMEM/GMEM, Stills, Macros etc. files are stored.
This menu also has an extensive Import/Export facility which also includes Media Management options.

To enter the Filing System menu touch **{FILING SYS}** button on the GUI, the menu below will appear.
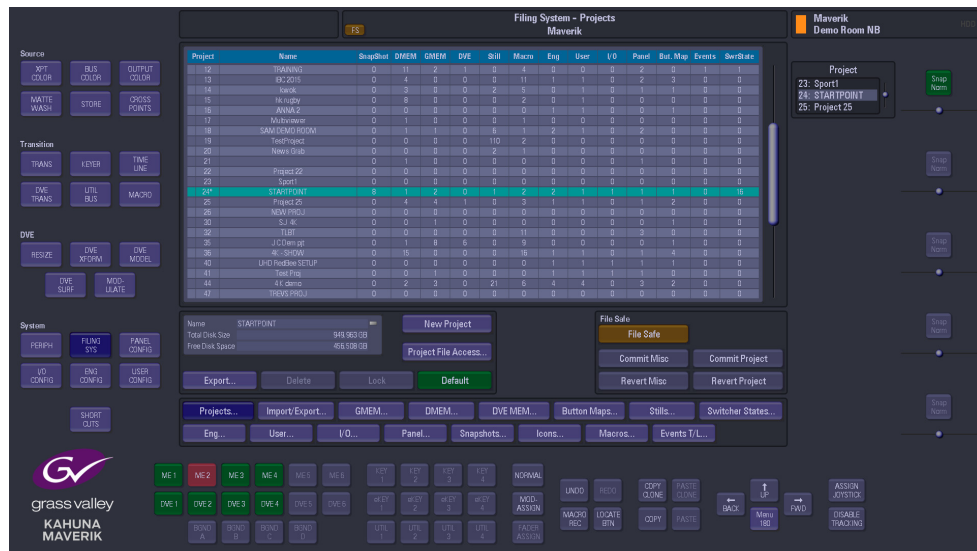
All the menus are straightforward, easy to use and are accessed, updated and deleted in a similar way. The exception being the Import/Export menu.

File Safe

What is File Safe

When a user loads a system setup file, for example loading a "Show" and then turns "On" File Safe, the original show setup files are kept "Safe" This will now allow the user to modify the show setup, i.e. add extra camera's to crosspoints or add macros and key layers, knowing that the original show setup files remain safe and un-touched.

The user will then have 2 options:

1 When finished, "Revert" back to the original setup state of the show and loose any filing system changes.

2 Save the new show setup state, using the "Commit" function, which will now overwrite the original show setup files.

The user has the option to either Commit or Revert on a per file, per project or all files basis. File Safe is easy to setup and gives a visual indication to the user that critical setups are not being overwritten unless the user wants them to be. Then after using the system, the user can quickly go back to the original file setup.
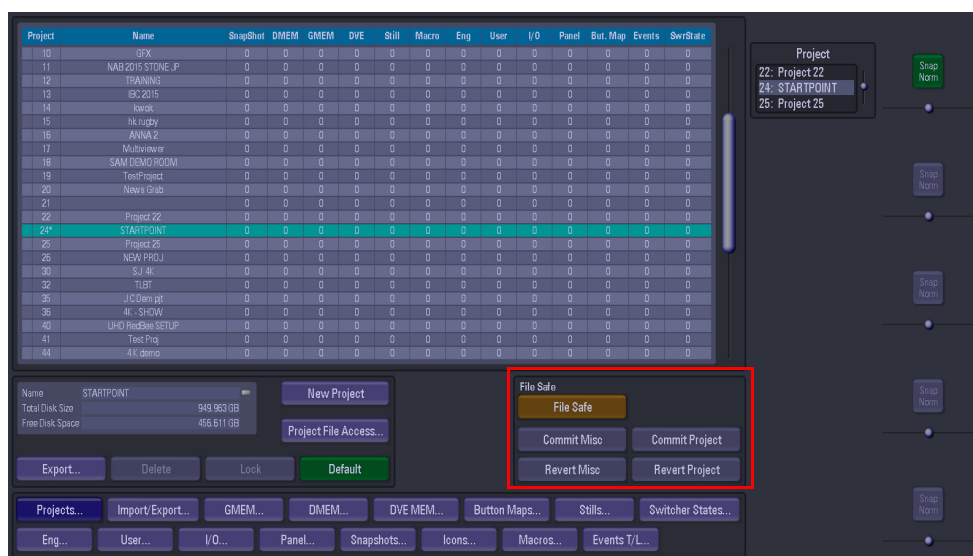
File Safe is accessed in the **Filing System** menus, the first menu to open is the **Filing System - Projects** menu, and it is where File Safe is turned On/Off.

How to use File Safe

The user can select a project that contains the setup files for a "Show" and then turn File Safe "**On**" by touching the **{File Safe}** button. The button will go green and an "FS" indicator is displayed in the center top bar area of the menu. The "**FS**" indicator is also green indicating that File Safe is active.

File Safe Indicator

File Safe On/Off Button
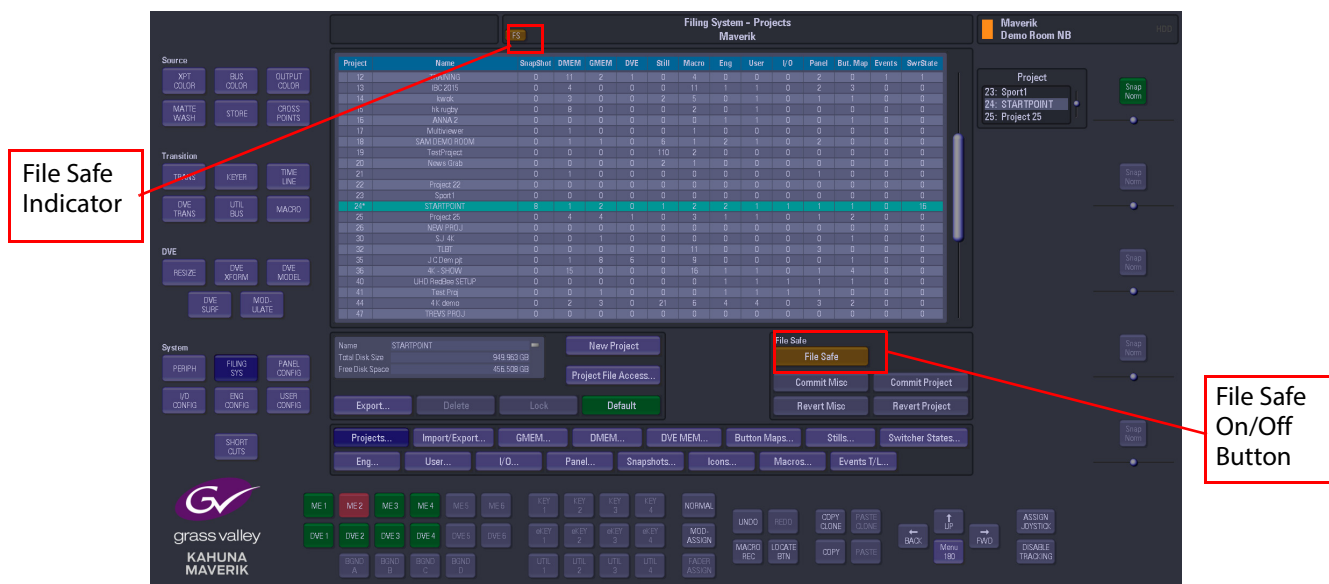
File Safe will remain active and displayed in the top bar until turned Off, below are the operational states of file Safe:

- No icon = OFF
- **Green** = ON but no files have been placed in the File Safe
- **Orange** = ON with files in the File Safe because files have been saved without being committed.

> Note: In the orange state, File Safe cannot be turned Off until all files have been "**Committed**" or "**Reverted**".

File Safe Buttons:

Commit Project - This will commit any new Files within the selected project, a pop up will appear need confirmation to commit.

Revert Project - This will revert any new Files within the selected project back to the original file state.

File Safe - Will Enable/Disable File Safe mode.

Commit All - Will commit ALL Filing System changes when Commit is pressed in the pop up dialog box, any filing system changes that have been performed after File Safe has been enabled will now become the current files and the File Safe will be emptied.

Revert All - Will Revert ALL Filing System changes back to the original file state. Any filing system changes that have been performed after File Safe has been enabled will now be copied to be the original files and the File Safe will be empty.

Saving files with File Safe turned On

When File Safe is ON, and a file (for example, User Config) is changed (overwritten, a copy of the original file is placed into the File Safe. In this condition the "FS" indicator in the top bar will turn orange.
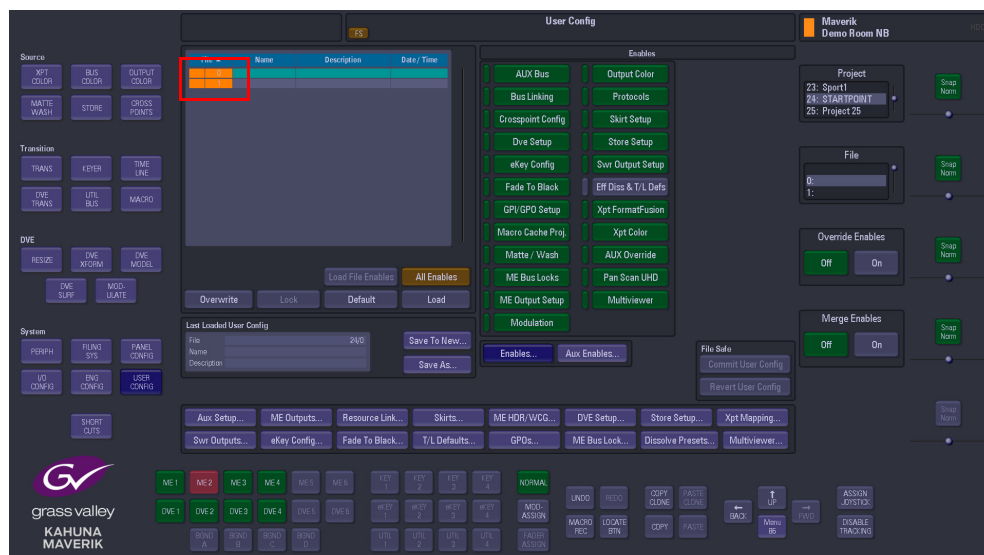
The menu with the saved file, will display the File Number with a yellow background fill, as shown below.
If the user now goes into the Filing Sys menu and looks at the Filing System - User Config menu, the file number will also have the yellow background indicating that the file has been saved (but not committed) since the File Save function was turned On.
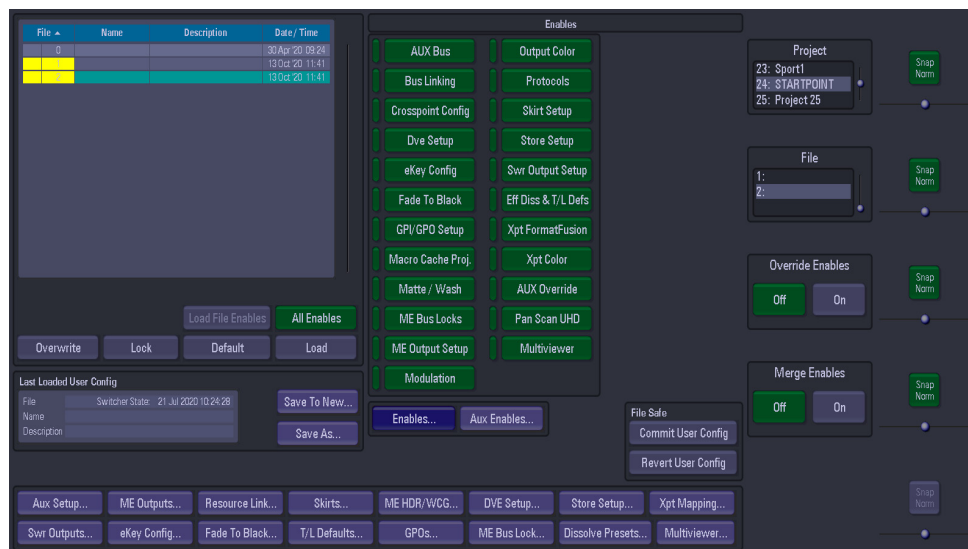
All subsequent loads of this file will load the new file. If the file is Reverted, the original file will replace the new saved file, the yellow fill will now be clear and all subsequent file loads will use the original file.

Note: This can not be undone.

Note: When overwriting a file multiple times, only the original file will have been put into the File Safe, so any Revert of this file will return to the original file (prior to File Safe being turned ON).

If the user commits the file, then this will now become original file; therefore the next overwrite will copy the committed file into the File Safe.

When File Save is active, the user is able to individually commit Button Maps, Engineering, User, Panel and I/O Config files, GMEMs, DMEMs and Macros into Projects, or commit them all together by pressing the **{Commit All}** button.

Multiple files can be changed and saved, they will all display the file number in a yellow background, and all can be committed or reverted.
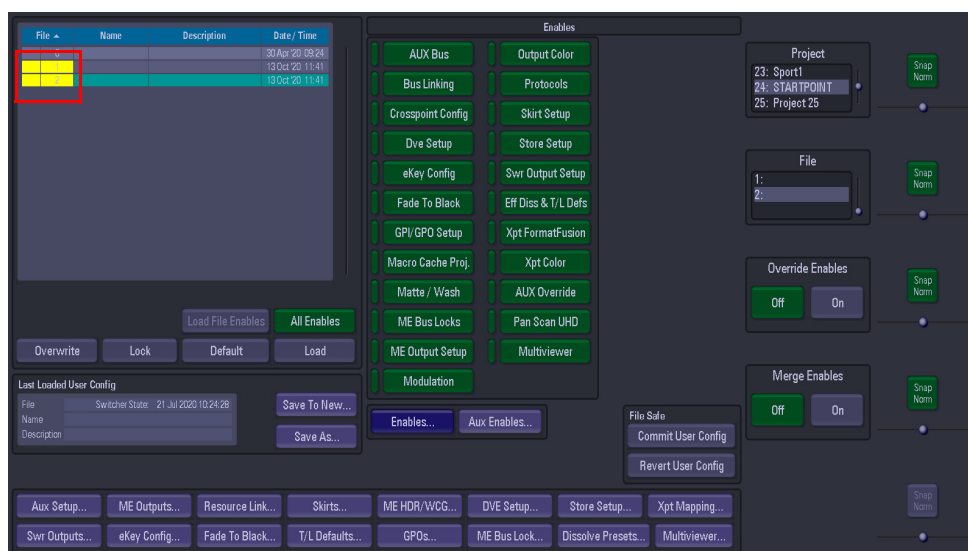
As mentioned earlier, when a file has been changed (e.g. User Config), the user is able to go into the "**Filing Sys - User Config**" menu (shown above) and only commit the changed Panel Config file. If the user has saved files in the User Config, Panel Config, created Macros and wants to commit all the changes, you can either touch the **"File Safe" {Commit User Config}** button, or go to the Projects menu in the Filing System menu and in the menu, touch the **{Commit Project}** button.
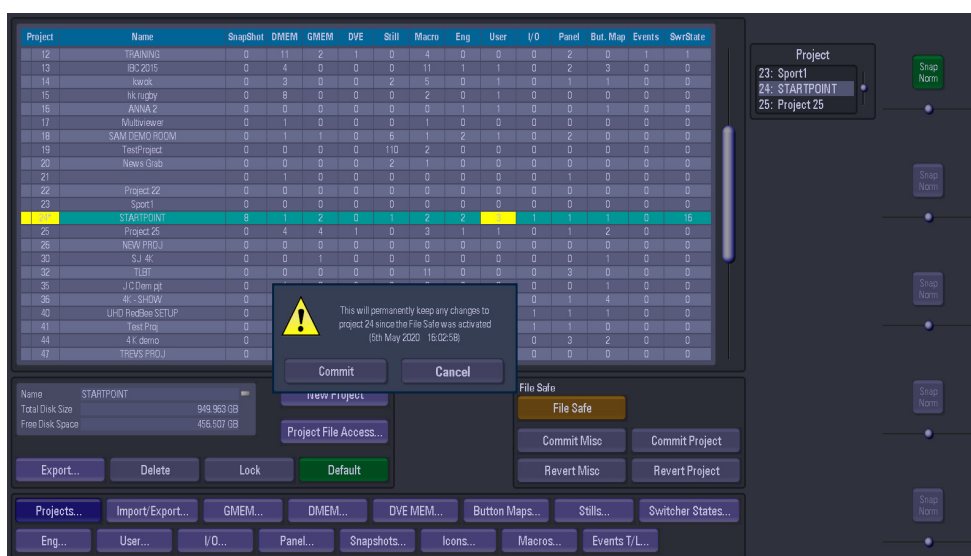
A warning dialog box will appear asking if the user really wants to commit filing system changes since File Safe was activated.

Deleting a file with File Safe turned On

The diagram below displays a file that has been deleted. It has not actually been deleted, it will still stay in the file list so that it can either committed or reverted.
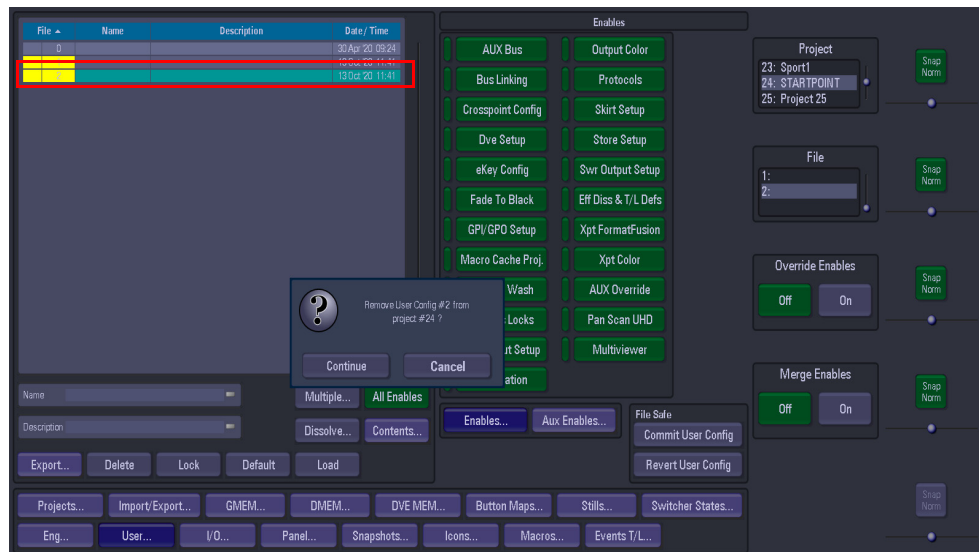
The file will not be deleted until the user presses the **{Commit}** button.

Projects

The default menu when entering the Filing Sys is the Project menu; where all the DMEMs, GMEMs, all the Configuration files, Button maps, Stills and Macros are all saved into Projects.

How to create a new Project

To create a new Project, touch the **{New Project...}** button (shown below). A new menu popup will be displayed with a number of options to select.
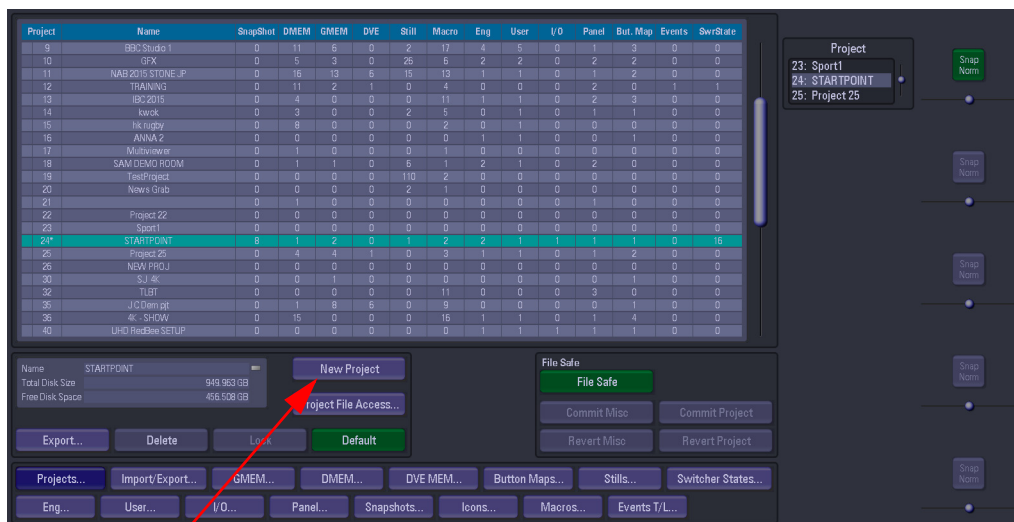
New Project button

The menu popup has a slide bar that displays all the empty, or available project numbers available to use. If for example you currently have "Project 24" selected, then the project slide bar will automatically select the next available project number in the table. The popup also allows the user to select the type of project that they want to create.
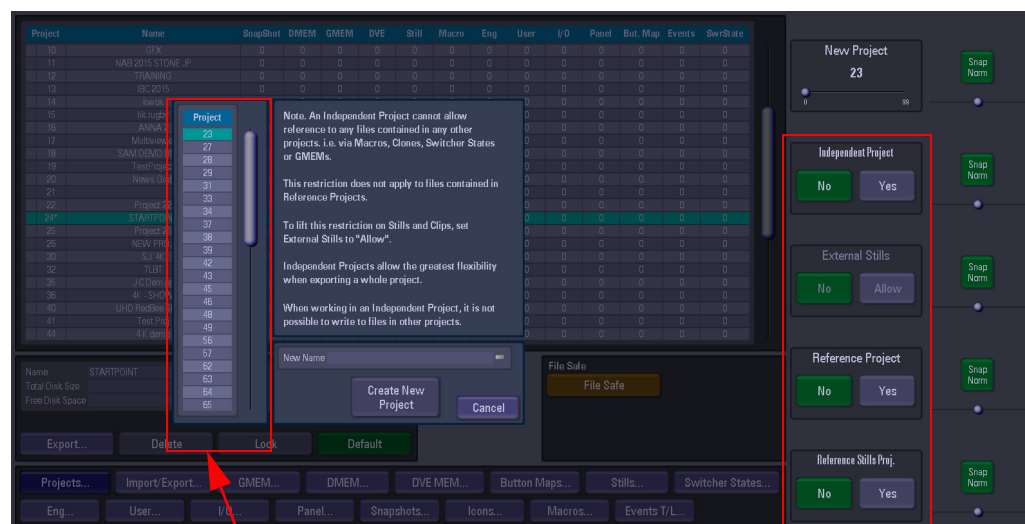
Project Number

There are two types of project that you can create; one is a "**Reference Project"** that references files such as stills, configs, macros and other files from other projects, this is the default setting. The second type of project is called an "**Independent Project**" this will only reference files

saved with the independent project, basically a stand-alone project with its own files. The advantage of an independent project is that it is easily transferable to another Kahuna system because an independent project doesn't rely on referencing files from other projects. The only consideration is that it does not have the same project number as one on the Kahuna you are transferring to.

Use the parameters (below) to select the type of project you want to create. If "No" is selected in all the parameters then you can create a project that references files from other projects in the system.

Independent Project - "Yes" will create an independent project.

External Stills - "Yes" will allow you to reference stills from other Kahuna systems on a network.

Reference Project - "Yes" will allow files to be referenced from other projects on the system.

Reference Stills Project - "Yes" will allow stills from other projects to be referenced.

Once you have selected the type of project you want to create, you can add a name by touching the "**New Name**" parameter. A keyboard will be displayed allowing you to type in a name. Touch **{Enter}** when done.

When done, touch the **{Create New Project}** button, and a new project is added to the table in the main project menu.

Note: Default and Snapshot projects can be user defined.
Project 0 is normally reserved as a default project unless the mainframe is split into more than 1 Logical Switcher.

Export a Project

The Export menu allows the user to export selected or all projects to an external hard drive or memory device. Touch the **{Import/Export}** button, then in the "**Export**" menu, touch the **{Project}** button.
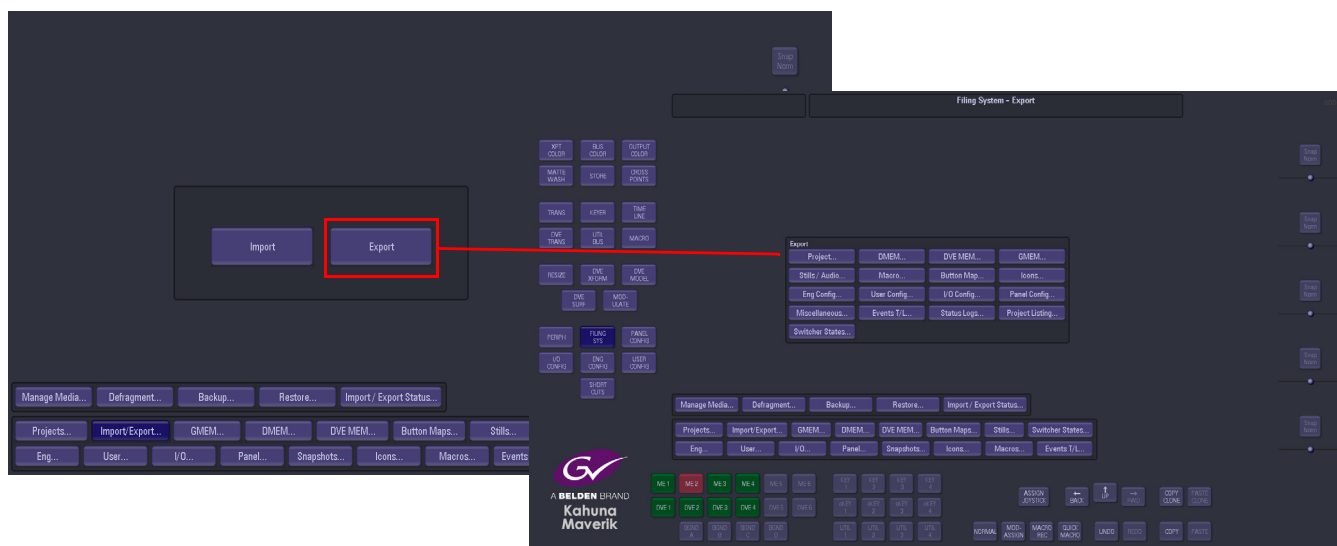
Use the Selector parameter to scroll down to the required project and press **{Select}**. Selected projects will have a small Green square next to the project number.
Pressing the **{Exclude}** button will exclude the selected project from being exported, the project number will have a small Red square next to the project number.

Pressing the **{Open/Close}** button will expand the contents of the selected project, allowing individual files within a project to be selected.
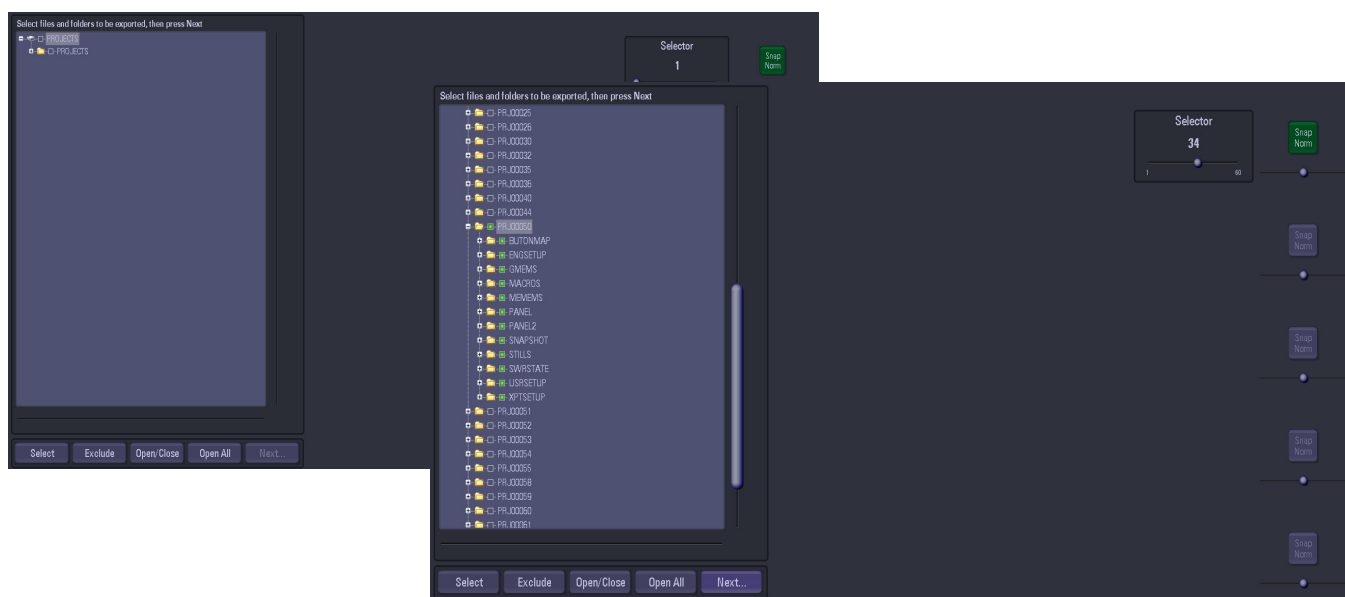
Press **{Next}** and a menu will open that allows the user to select a device to export the project or project file to. Use the "**Destination Device**" parameter to select the memory device and press **{Select Device}**, the menu will now display the contents of the device.
Select a folder where the project information will be exported to, or press the **{New Folder}** and a **New Folder** will be created on the memory device. Press the **{Rename}** button and the on-screen keyboard will appear allowing the user to give the "**New Folder**" a name.

Finally, press **{Start}** and the selected project information will be placed on the memory device.

Delete a Project

To delete a project, select a project using the Current Project parameter control then press **{Delete}**. A dialog box will appear requesting confirmation of deletion.
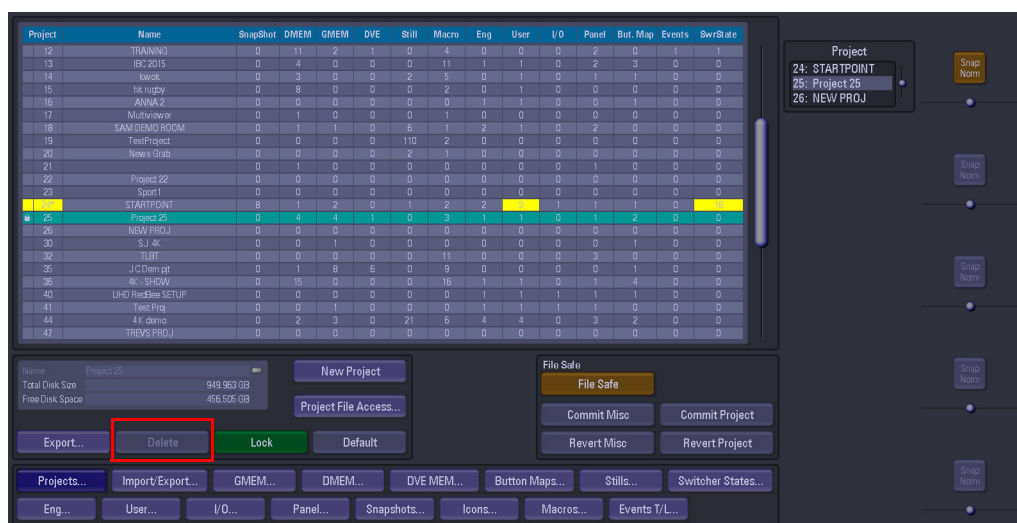
Project Locking

Each Project can now be locked to prevent files from being written and deleted. This is indicated by the Pad Lock symbol next to the Project.
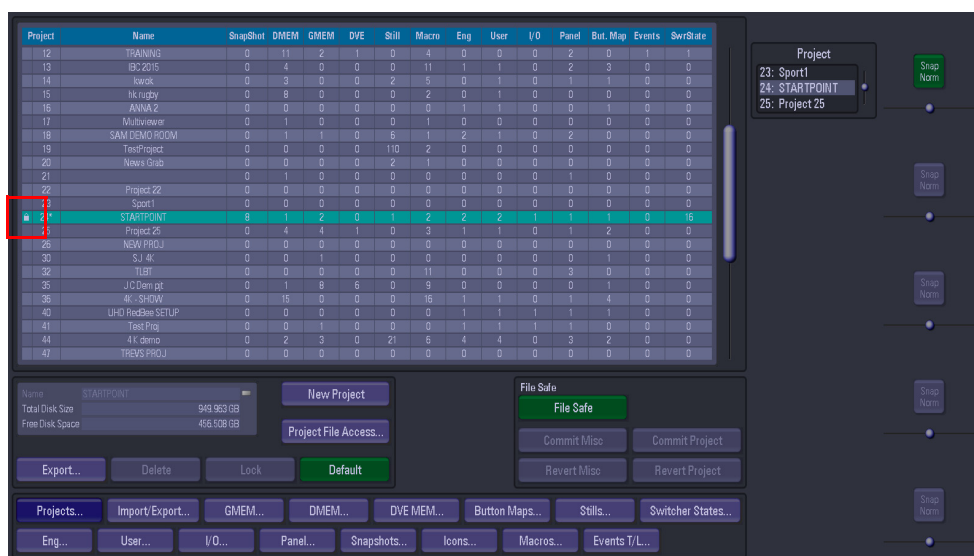
Default Project

Pressing the **{Default}** button will change the default project from being project 0 to being a user defined default project. A suffix symbol "*"will be added next to the project number to indicate that it is now the default project.

Filing System - Config Filing System

The Eng Config, User Config, I/O Config and Panel Config menus all have exactly the same functionality, so for this example the Eng Config will be used.

> Note: The Eng, User, I/O and Panel Configs are saved within their own menus, in the currently selected project.
> The Filing System "Config" menus are used to Export, Delete, Load, set Enables and make Default.
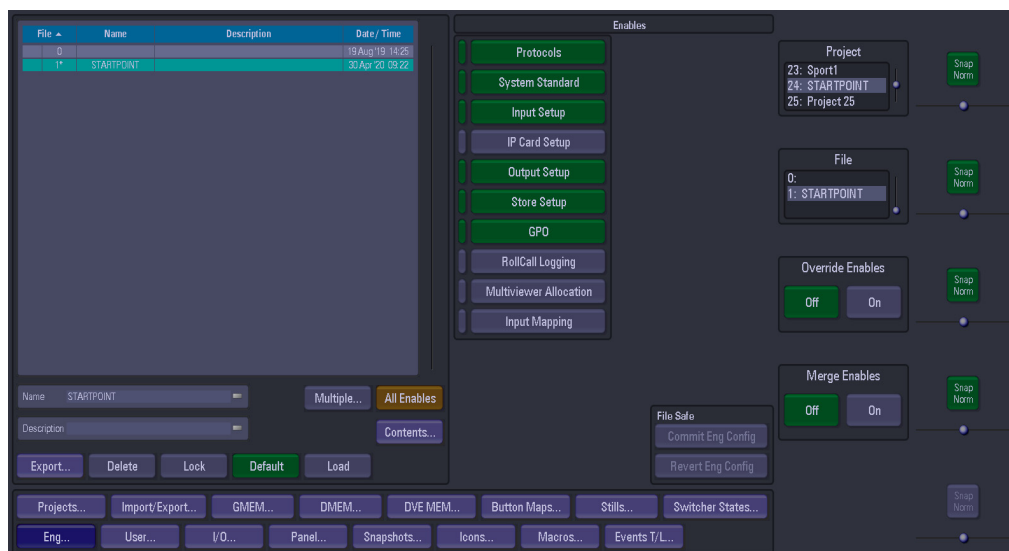
Overview

All Config files can be saved into a default project or into a user defined project. Config files are saved within their own Config main menu, meaning that if a specific Eng Config setup is created by a user before the file can be saved, the user has to go into the Eng Config menu and use the "**Save As**" function.
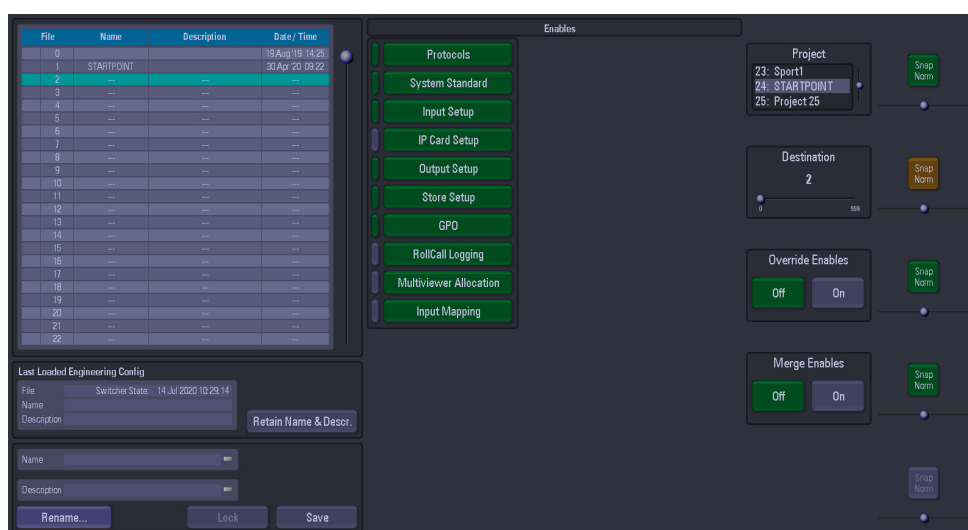
In the "**Eng Config**" main menu, touch the **{Save As...}** button, select a Project from the **Current Project** parameter, this is where the Eng Config setup is recalled from, use the **Destination** parameter to create a new Eng Config file position, give the file a name and description and finally press the **{Save}** button. (see the Engineering Config section of this manual).
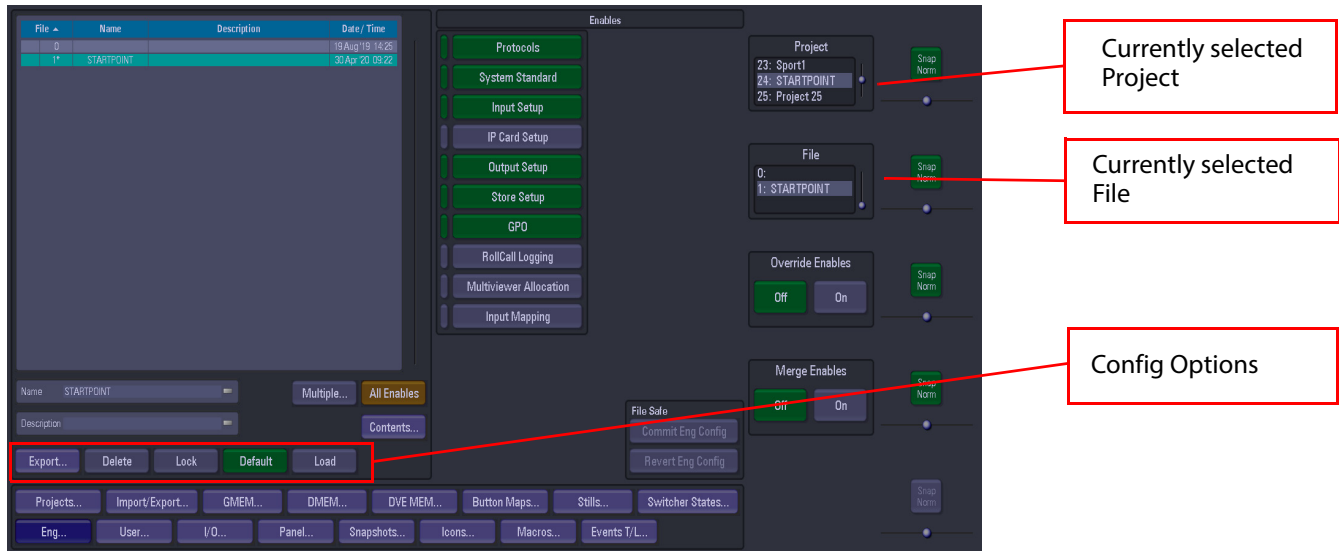
Filing System - GMEM, DMEM and Macros

The following explanation is an example of how to use the GMEM, DMEM and Macros menus. As states previously, these menus basically all work in the same way, there is only a slight variation in options for GMEM's and Macros.
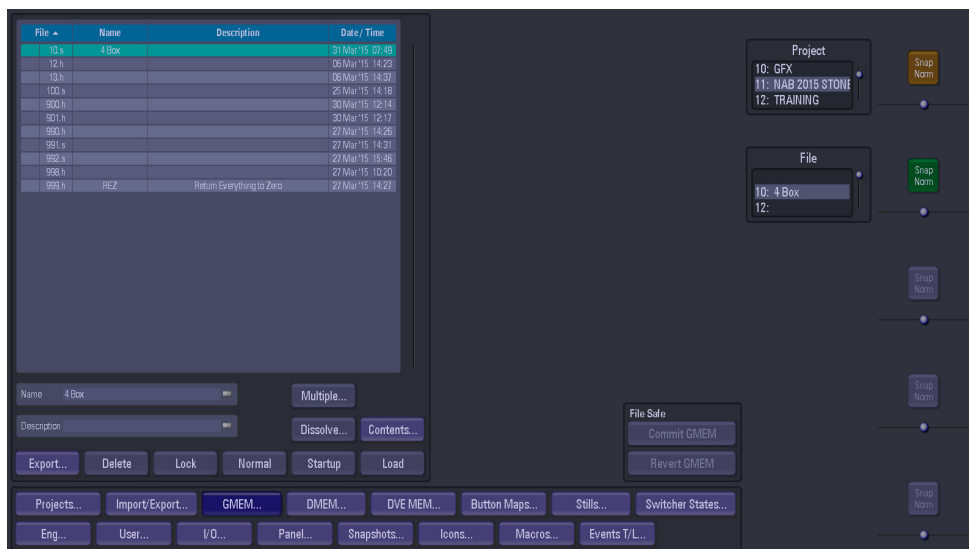
GMEM Export

The Export menu allows the user to export selected or all GMEM's within a selected Project to an external hard drive or memory device. Press the **{Export}** button.
Use the **Selector** parameter to scroll down to the required project and press **{Select}**. Selected projects will have a small Green square next to the project number, press **{Open/Close}** to expand, select the project folder and press **{Open/Close}** again to expand the GMEM folder which will now display the individual files within the GMEM.
Scroll down to the required file and press **{Select}.**
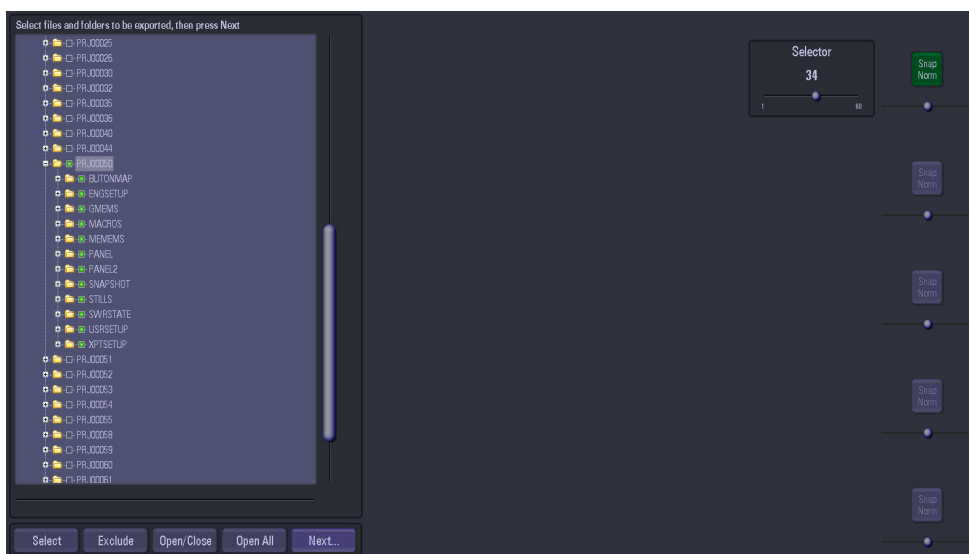
Pressing the **{Exclude}** button will exclude the selected project/file from being exported, the project number will have a small Red square next to the project/file number.

Pressing the **{Open/Close}** button will expand the contents of the selected project, allowing individual GMEM files within a project to be selected.

Press **{Next}** and a menu will open that allows the user to select a device to export the project or GMEM file to.

Use the **Destination Device** parameter to select the memory device and press **{Select Device}**, the menu will now display the contents of the device.
Select a folder where the GMEM file/s will be exported to, or press the **{New Folder}** and a **New Folder** will be created on the memory device. Press the **{Rename}** button and the on-screen keyboard will appear allowing the user to give the "New Folder" a name.

Finally, press **{Start}** and the selected information will be placed on the memory device.
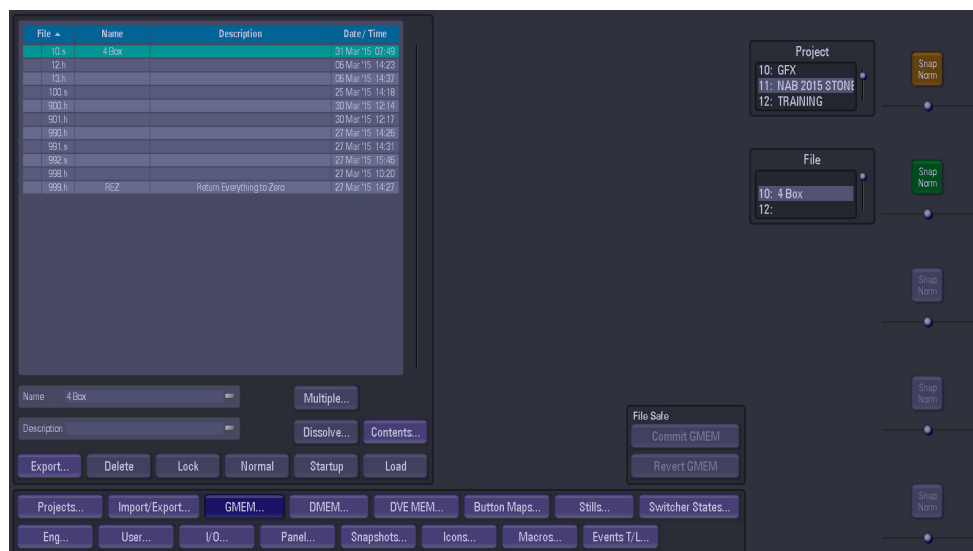
Delete GMEM

To delete a GMEM/s, use the **File** parameter to select the GMEM, then press **{Delete}**. A dialog box will appear asking if the user wishes to Continue or Cancel.

Lock GMEM

Each GMEM can be locked to prevent them from being over-written or deleted. This is indicated by the Pad Lock symbol next to the GMEM.

Normal

This will load the user defined Factory Default GMEM settings and take the system back to those factory default settings state default i.e. resize setting set to various measurements, when normalizing resize they will default to those measurements rather than factory setting

Startup

This will set a user defined GMEM to a startup state, for instance, if the Kahuna mainframe is rebooted when a software update has taken place, the mainframe will startup in the user defined "Startup" GMEM state i.e. with resize parameters set to 0.00 they will start up at 0.00, or if the GMEM includes resize measurements that start up at 5.369 then it will start up in that state

Load GMEM

The **{Load}** button is used to load a selected Engineering Config File.

DMEM - Copy to Button

In the **Filing System - DMEM** main menu, a "**Copy To Button**" button can be used to quickly attach a selected DMEM to an OLED button.
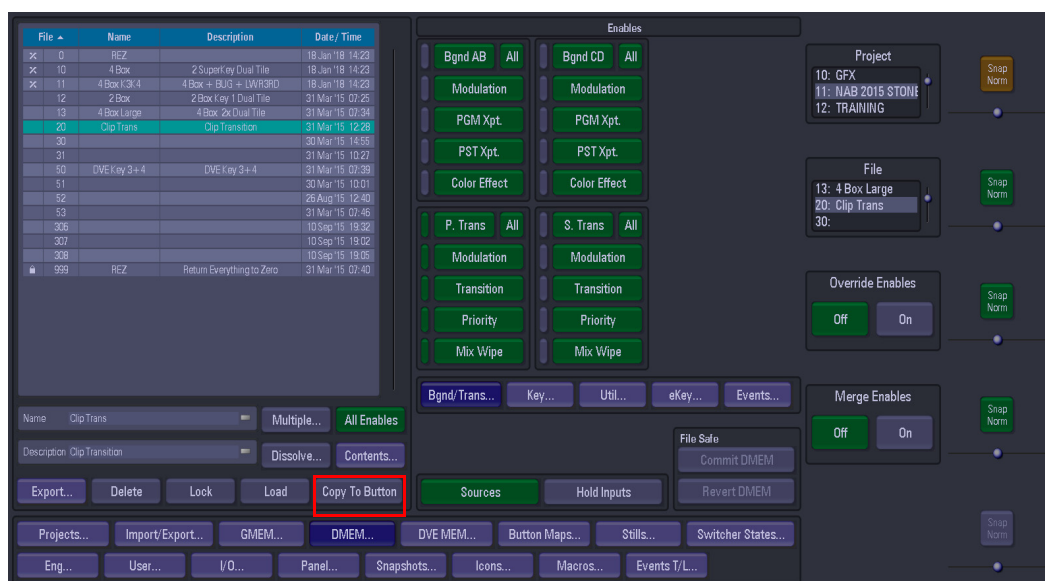
To use this feature, touch and select a DMEM file from the table in the menu, and then touch the **{Copy To Button}** button. The buttons on the control surface will light up white and pulsate. Now, touch the OLED button and the DMEM will be attached to that button. By default, the button will display the Project number and the DMEM file number. You can change what is displayed on the button, such as an icon or user defined text in the **Panel Config - User Function Buttons** menu.

Macro

The macro menu has a slightly different menu options from all other menus in the Filing system.

Macro Assignment Buttons
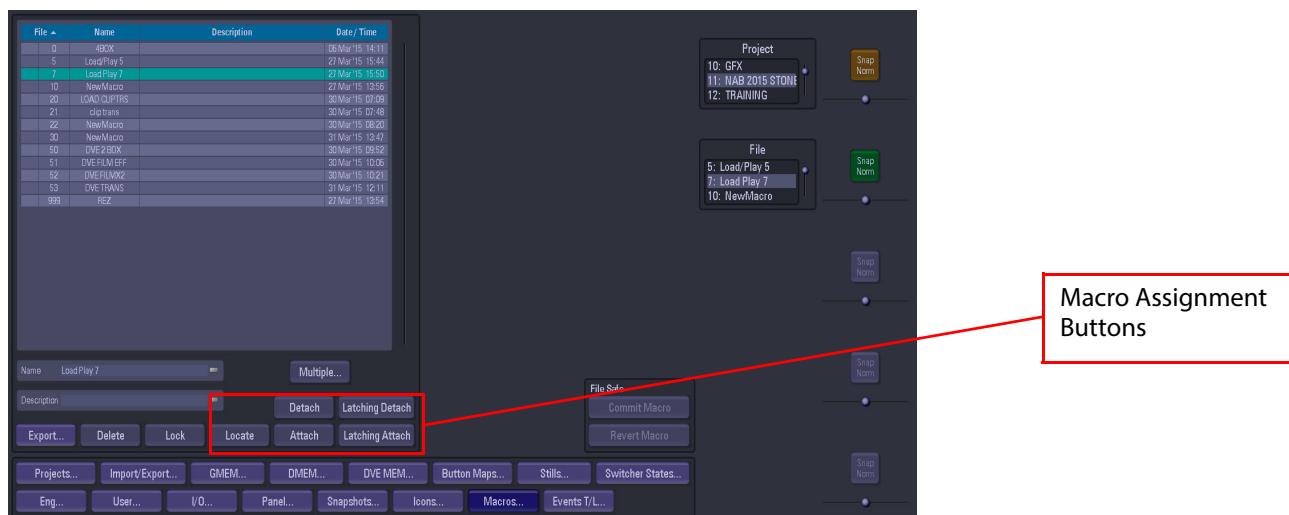
Macro Assignment

The macro menu has the same Export, Delete and Lock functions as all other menus in the Filing System. The functions that make this menu different are the Macro Assignment buttons. Once the user has selected a macro in a project as shown in the menu above, the assignment buttons allow the user to **Locate** the selected macro if it has been attached to a button on the control surface, **Attach** the selected macro to a button on the control surface, or **Detach** a macro from a button.

To attach a macro to a button on the control surface, first select a project using the Current Project parameter and then select a macro within that project.

Press the Button Assignment **{Attach}** button and the button will go Red. All the control surface buttons will now go out ready for the user to select a button; buttons with macros already assigned will go Green. If the selected macro is already assigned to a button it will be lit Red.

> Note: The same macro can be assigned to as many buttons as required.

Press the button on the control surface where the selected macro is going to be attached, the panel will return to the normal configuration and the macro will be attached to the button.

To detach a macro from a button on the control surface, press the **{Detach}** button, once again the button will go Red. The control surface lights will go green for buttons with macros attached and any button which has the currently selected macro will be lit Red. Press the button you want to detach the macro from. The control surface will now return to its normal configuration. The **{Detach}** button in the menu will go dark and the macro will no longer be associated with that button.

> Note: The macro is not deleted from the project, just removed from the button it was attached to.

To find out which macros are attached to buttons, press the **{Locate}** button, any button on the panel with a macro associated with it will either be lit Green or Red as described above. Pressing a button on the control surface which has a macro attached will highlight the macro in the table. This will work in reverse as well, to find the particular macro, select it in the macro table, then press the **{Locate}** button. Any button with that macro attached will light Green.

Import/Export

This menu is used to import/export Projects, Stills, GMEMs, Macros and configurations from a USB/eSATA memory device.

Kahuna can Import up to 100 projects, and 1000 (0 - 999) Configs, Stills, Clips, Macros etc. into each project.
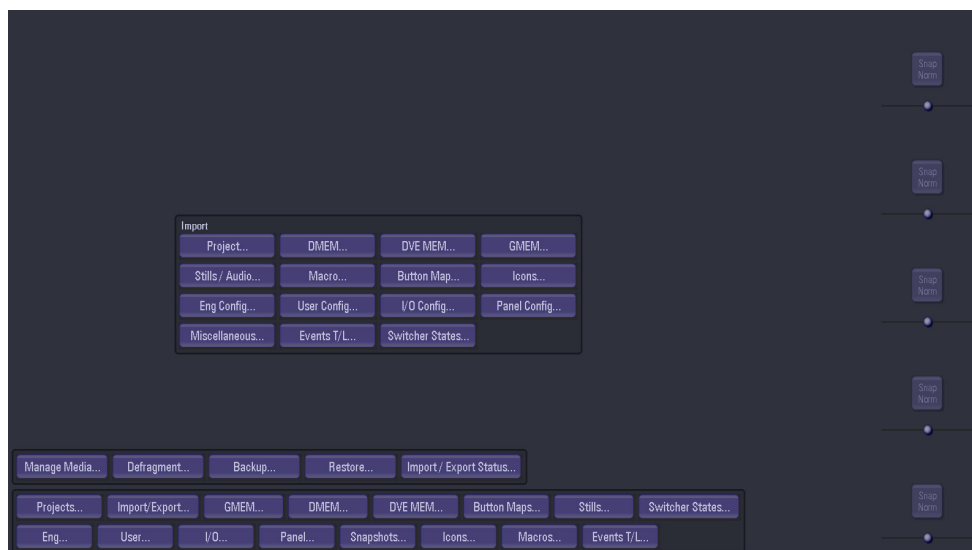
The Import and Export menus all work in the same way where the user will select Project or individual file to import or export, the menu displays a familiar folder structure which is easy to navigate and use.
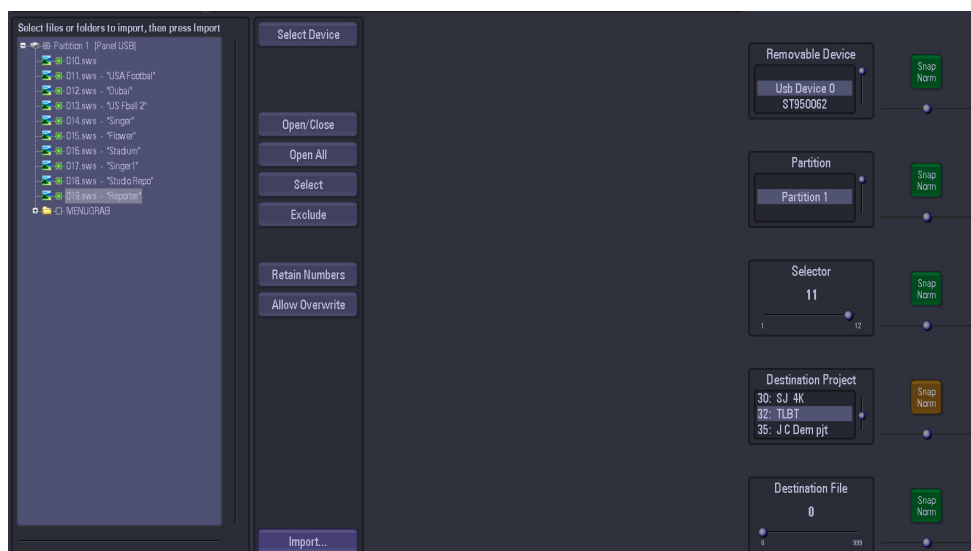
Exporting

To export a project, GMEM, DMEM or still etc, press the button of the project/file, (this example is a Project) then a menu as shown below, use the Selector parameter to select the Project that is to be exported.
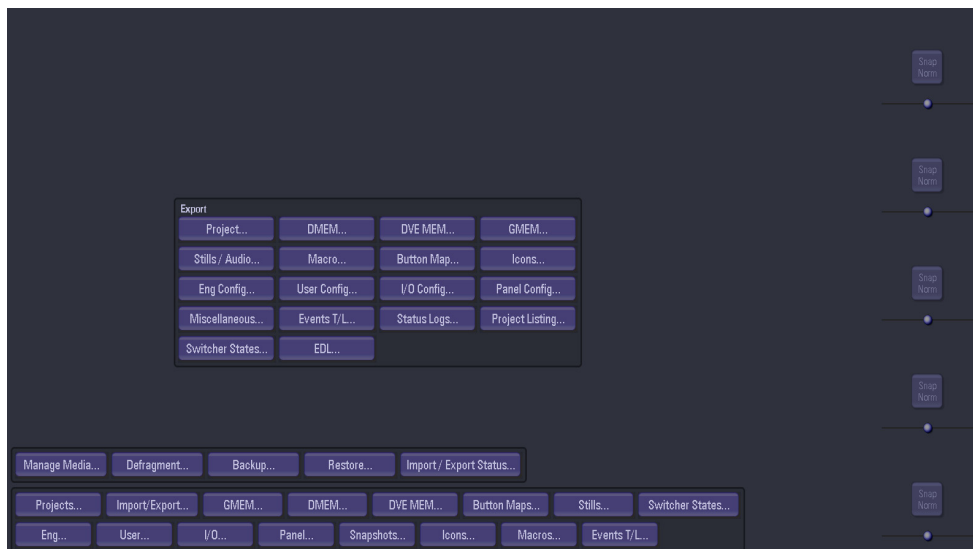
To make sure that the right project has been selected, press the **{Open/Close}** button to expand the file structure. Press the **{Select}** button to select the project and a Green square will appear next to the project number.
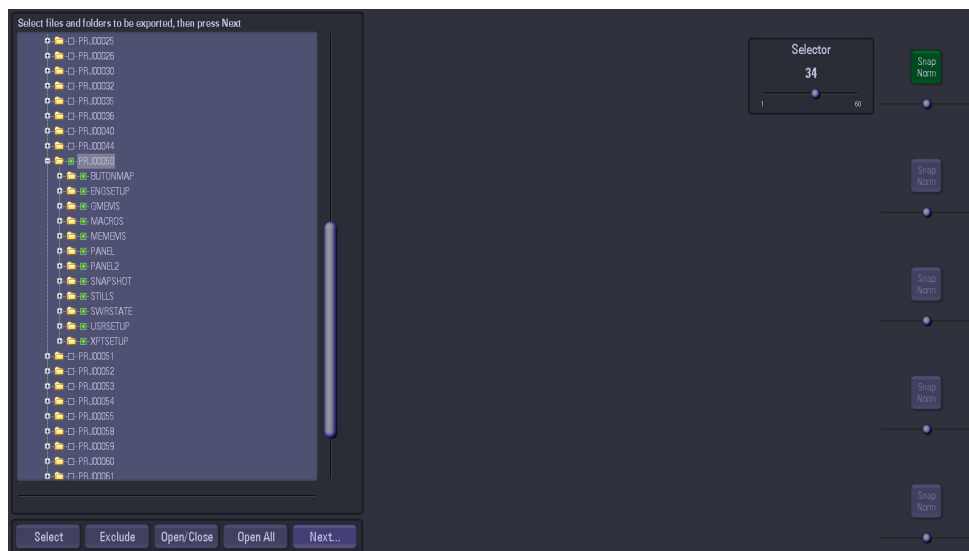
The next menu to appear allows the user to select a memory device to export to. Use the Destination Device parameter to select the memory device, then press the **{Select Device}** and the menu will display all files on the device.

> Note: The Partition parameter is only used if the device has been partitioned.

If the user wants to export the information to a new folder on the memory device, use the Selector parameter to scroll down the folder structure to the required position and then press the **{New Folder}** button, a new folder has now been created on the memory device.

Press the **{Rename}** button and an on-screen keyboard will appear allowing the user to input a name for the folder.

The **{Open/Close}** button will expand a selected folder on the memory device and the **{Open All}** button will expand all folders.

To start the export of information press the **{Start...}** button, a new menu will be displayed showing the progress of the export as shown below.
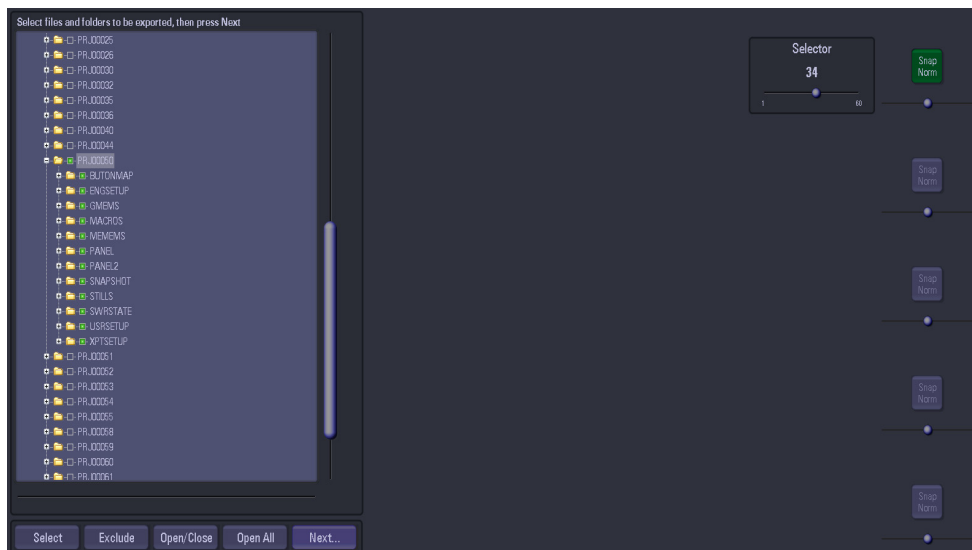
As the files are exported a progress bar is displayed at the bottom of the menu, once complete the word "Complete" is displayed in the Status column.
The **{Purge Done}** button will delete a selected file in the menu, **{Advance}** will advance the selection bar down one step in the menu if multiple files are exported. The **{Cancel}** button will cancel the export at any point as the files are exporting to the memory device.

Importing

Importing Files/Projects in to the Kahuna is a similar process to exporting as explained on the previous pages, the import process is done via one menu.
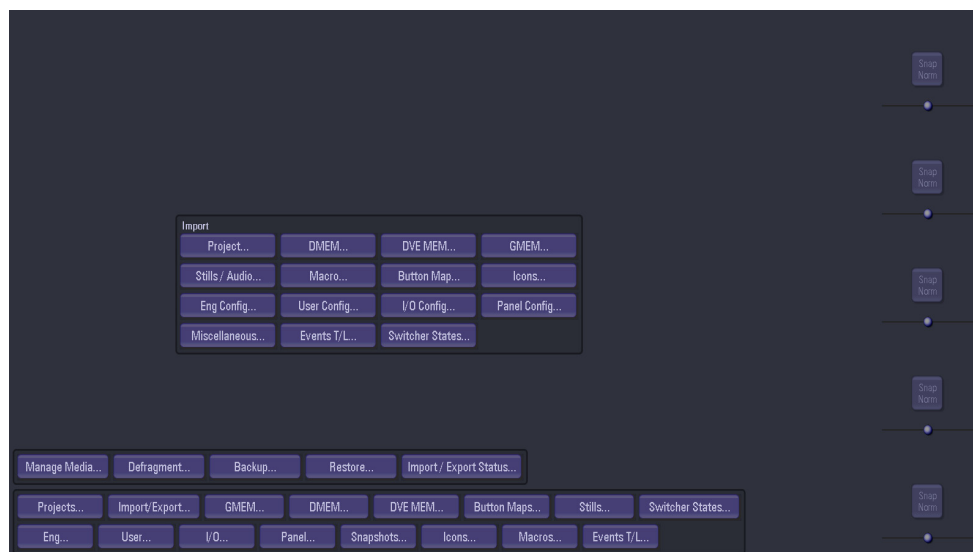
Use the **Removable Device** parameter to select the memory device, press the **{Select Device}** button and the information on the memory device will be displayed in the menu.
Use the **Selector** parameter to scroll through the folders on the memory device until the required folder is reached. Press the **{Open/Close}** button to expand the folder and use the **Selector** parameter to scroll to the required file, use the same method to select multiple files in a folder.

> Note: Projects, GMEMs, DMEMs, Stills and Clips or any type of file that is numbered can retain their numbers by pressing the {Retain Numbers} button.

User the **Destination Project** and **Destination File** parameters to select where the files will be imported to, and then press **{Import}**.
The selected information will now be imported into the Kahuna mainframe. As with the Export menu an **Import Status** menu will be displayed.
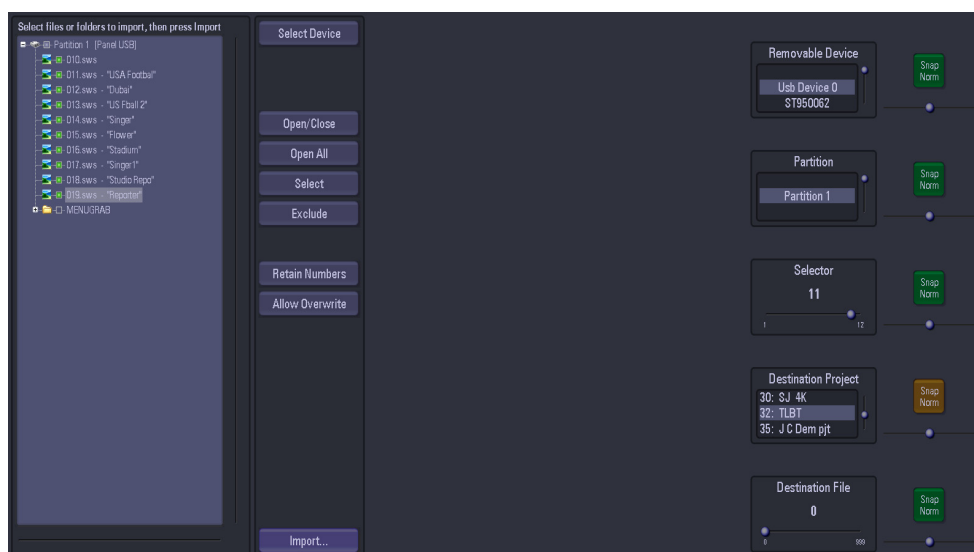
Manage Media

The **{Manage Media...}** menu allows the user to format or partition a memory device or external hard disk drive.

The **Removable Device Configuration** attacher displays the information regarding any selected external memory device connected to one of the ports on the mainframe or GUI. As the user scrolls through the list of devices using the **Removable Device** parameter, the information in the attacher changes to reflect the selected device.
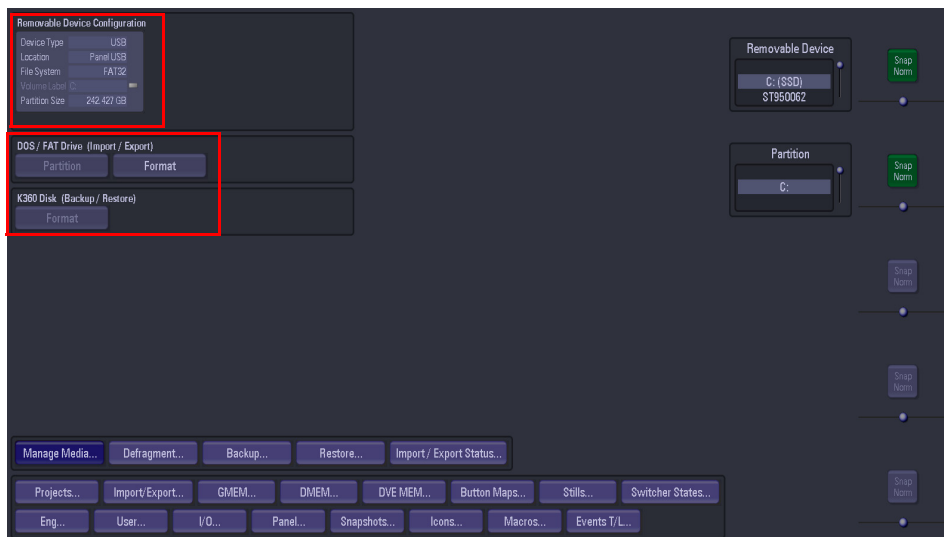
If the **{Format}** button is pressed a warning dialog box will appear, prompting the user to make a decision.

> Note: Only press **{OK}** if the selected device is to be formatted.

The **{Partition}** menu will, as the dialog box says erase all the data on the device and create new FAT16 or FAT32 partitions, select the type of partitions required.

> Note: Only press {**OK**} if the selected device is to be Partitioned.

K360 Disk (Backup/Restore) - Format
This option will format the selected system disk and format the disk to become a K360 backup disk.

> Note: It is important to understand that if this disc drive contains important information pressing **{OK}** will delete all data on the disk!
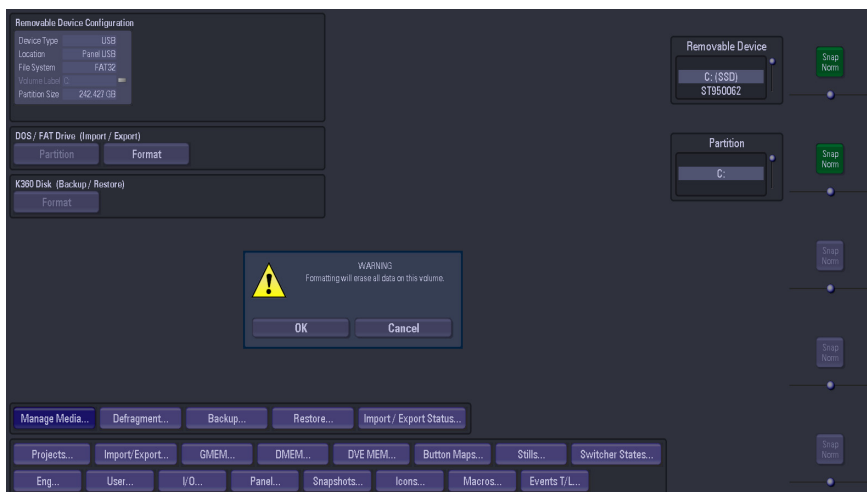
Defragment

As files are being accessed and written to on the Kahuna mainframe hard drive, over time the drive will become fragmented and the files scattered all over the disk, this will in turn start to slow down the access speed of the disk drive. The Defragment function works in the same way as defragment on a computer and will re-align the files on the hard drives, this will free up space and make the access time to files faster.

Defragmentation only needs to be done periodically. Press the **{Analyze}** button to analyze the hard disk drive. This will display whether the disk will need defragmenting.

Press the **{Defragment}** button to start defragmenting the drive. Press **{Abort}** to stop the defragment process.

Backup

This menu allows the user to set backup schedules for the internal SATA disks.

The Kahuna mainframe will have either 2 or 4 SATA drives fitted, the number of disk drives fitted will depend on the mainframe having 1 or 2 Control Cards. (as shown below, the system has 4 disk drives, so has 2 Control cards).
The backup mechanism can back up the system drive (independent or RAID pair) to another Kahuna drive (independent or RAID pair). The location of the system drive and the backup drive(s) can either be on the first or second Control Card, it does not matter.

Note: Un-allocated and DOS formatted drives are not available for backup. The disks will be displayed as "Un-allocated" or "DOS" disks and will have been configured in the Mainframe Configuration menu, before logging into the system.

Note: Configuring SATA drives to be used as backup disks is be done in the Mainframe Config menu.
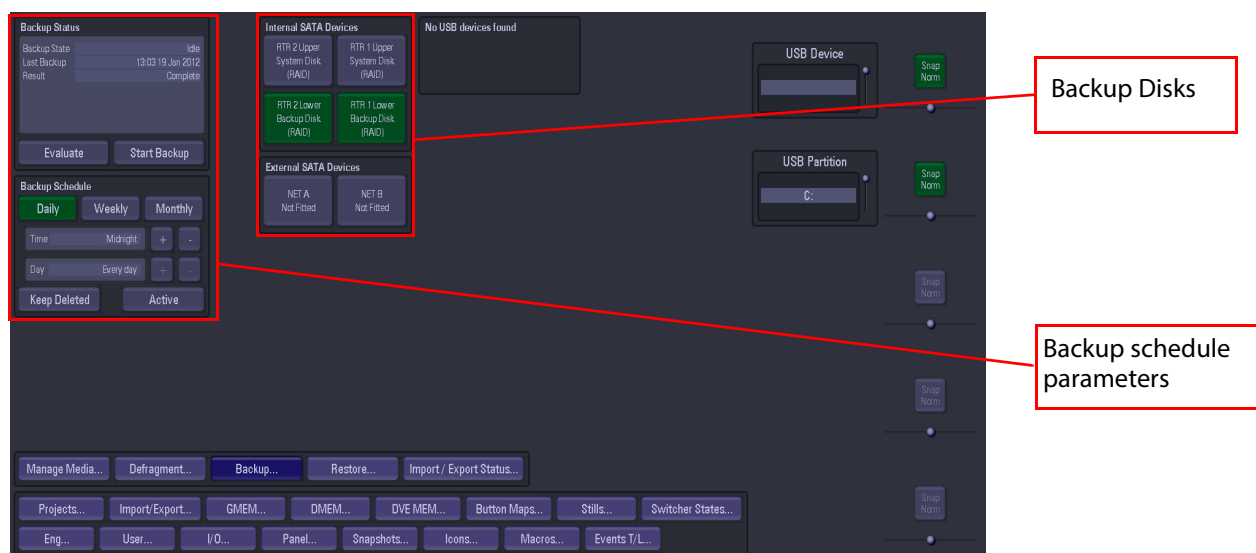
Each disk drive (independent or RAID pair) that is not configured as a system drive, can have a backup schedule associated with it. This can be daily/weekly/monthly and can be individually activated. This means that a backup could be setup to do something like a daily backup to an one internal SATA drive and a monthly backup to another external drive.

To setup a backup schedule, touch a backup disk to select it and it will turn green, and then use the Backup Schedule parameters to set a Daily, Weekly or Monthly backup.

An instant backup can be started by touching the **{Start Backup}** button.
External SATA drives can also be attached to the mainframe (SATA ports on the NET Fin) and used as backup drives.

Keep Deleted - when running a backup, it builds a list of all files and folders that have been "**Created**" (exists on system drive but not on backup drive), "**Modified**" (different on system and backup drive) and "**Deleted**" (exists on backup drive but not on system drive). If **Keep Deleted** is **Off** (not lit green), the next thing that is does is delete from the backup drive all the 'deleted' files and folders. When finished, the drive copies all '**Created**' and '**Modified**' files and folders. This is similar to an incremental backup because it will only backup files and folders that have been created or changed.
If **Keep Deleted** is turned **On** (lit green), files and folders that were previously backed up will not be deleted.

This has the advantage of being able to go back and restore files that were deleted from the system drive before the last backup, but the disadvantage of this is that the backup drive will fill up with more and more things that no longer exist on the system drive.

Note: When backing up, it creates an exact copy of all the partitions on the system drive (assuming that "Keep Deleted" isn't turned on). Once the backup is complete, the user could simply switch over to using the backup disk as the system disk.

Note: If the Kahuna mainframe boots up and it cannot find the preferred system drive, the mainframe waits for up to 20 seconds for it to appear, then will attempt to use another disk drive that contains the minimum information, (this can be a backup drive). Once the system is happy with the drive, it will switch itself over to treating that as the preferred system disk and avoid the 20 second wait on subsequent boots.

Restore

This function as the name suggests restores files to the system RAID drives from an internal or external backup disk drive.

In the Restore menu, select a backup disk drive by touching the disk drive button, if the drive is available, the button will turn green. The status of the drive and when it was last used to back up files will be displayed in the Restore Status area of the menu.

The user then has 3 options of restore:

- Restore Files Since Backup - restores all files that have been deleted since the last backup.
- Restore Files Modified Since Backup - restores all files that have been modified since the last backup
- Remove Files Created since Backup - removes all files from the **system disks** that have been created since the last backup.

Once a restore option has been selected, press the **{Start Restore}** button.

Import / Export Status

This will as the menu suggests, allows the user to check up on the status of any files being imported or exported.
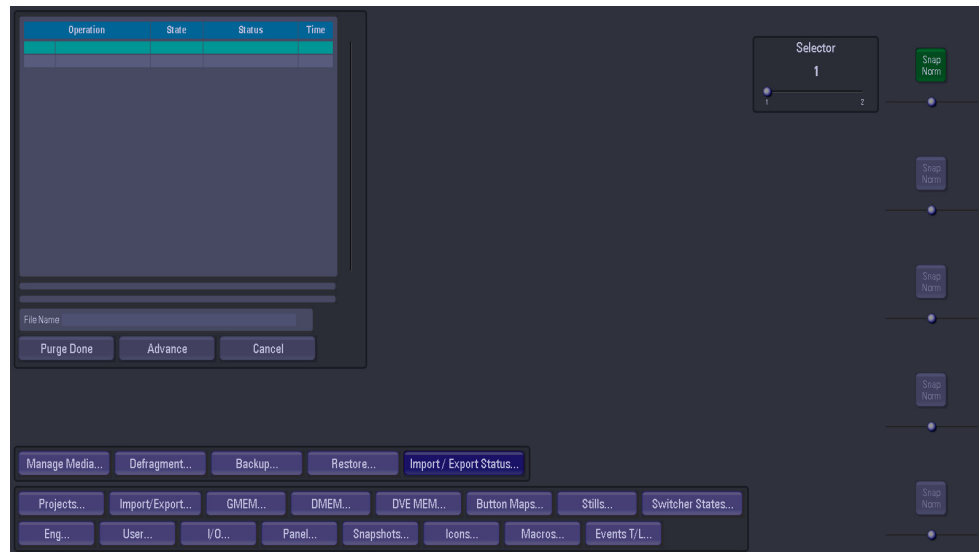
If a file is being imported/exported accidentally and it is not required, scroll to the file with the **Selector** parameter and press the **{Purge Done}** button. The file will be deleted from the list.

The **{Advance}** button will advance the import/export process to the next selected file to be imported/exported.

IPI and IPO Setup

Kahuna IP Switchers Overview

With the introduction of the 50GbE IPI/IPO Fins, Kahuna now has a fully IP-enabled Kahuna IP switcher range with 40GbE and 50GbE input and output Fins to choose from.

The introduction of these IP Fins has enabled our customers to replace individual SDI input or output Fins on standard Kahuna systems with IP Fins. Allowing current Kahuna users to transition to IP at a rate which suits their developing needs.

Kahuna can be pure SDI, hybrid SDI/IP in any combination or pure IP, IP-enabled Kahuna's support interoperability with both uncompressed SMPTE 2022-6, SMPTE 2022-7, TR-03 and lightly compressed VC-2.

If upgrading to IP Fins, installation of the IP Fins is simple and fast - they simply slot into the mainframe in place of one or more existing SDI Fins. A scalable upgrade solution without any infrastructure headaches - Kahuna's IP Fins handle all the processing on-board with no need for extra external boxes.

The software version that supports the IPI and IPO Fins is V7.4r2 and greater.

> IMPORTANT: The 40GbE and 50GbE Fins can only be used with Kahuna mainframes that have the higher power (RED) backplane. Please speak to the Grass Valley customer support team for information.
> To update the software on the IP Input and IP Output Fins, please see the "Kahuna IP Configuration Supplement Manual"

NMOS

Kahuna is NMOS compliant.
Networked Media Open Specifications, collectively known as NMOS, have been developed to provide interoperability between a wide range of products from various manufacturers. NMOS effectively provides a control and management layer in addition to the transport layer provided by SMPTE ST2110. See https://www.amwa.tv/nmos for further information.

Kahuna IPI and IPO Fins

40GbE IPI40 Input Fin

Signals supported over RTP stream per input Fin Module. 2 x 40GbE QSFP Cages.

SMPTE 2022-6
Inputs - 12x 1.485Gpbs Format Sources
Inputs -12x 2.970Gpbs 1080p Format Sources

VSF TR-03 (SMPTE 2110)
Inputs - 12x 1.485Gpbs Format Sources
Inputs - 12x 2.970Gpbs 1080p Format Sources

SMPTE 2022-7
Inputs - 12x 1.485Gpbs Format Sources
Inputs - 12x 2.970Gpbs 1080p Format Sources

SMPTE 2042 (VC-2)
Inputs - 12x 1.485Gpbs Format Sources
Inputs - 6x 2.970Gpbs 1080p Format Sources

Ethernet Signals
SFP + Optical 2x 40G Ethernet
Conforms to IEEE 802.3ba – 40Gigabit over fiber.
SFP + connected Cable 2x 40Gigabit Ethernet over twin axial cables.

2x 40GbE SFP Cages optional SFP Modules)

1x RJ45 Network Port

Not Currently Used
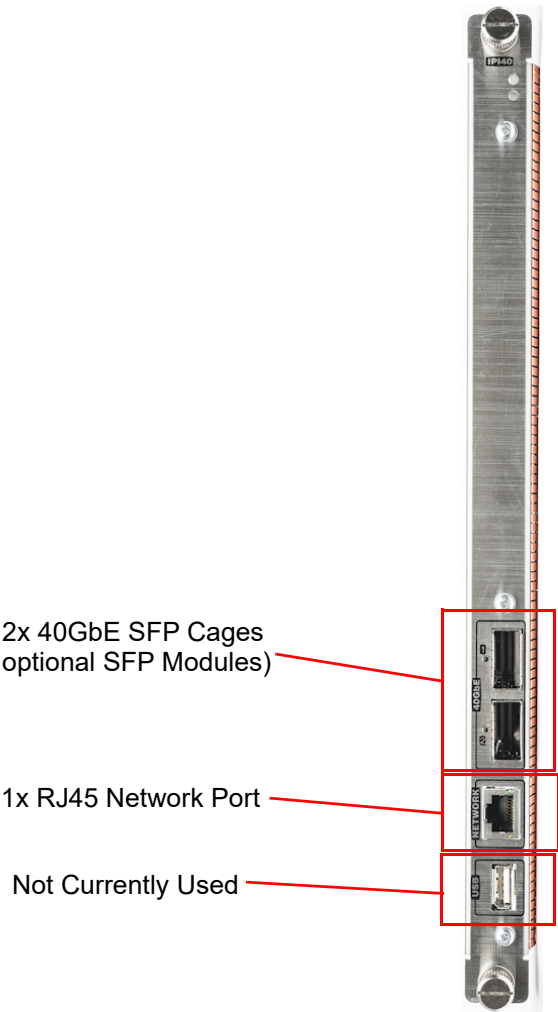
Input Configuration	
Kahuna Input	IPI40 Spigot
A1	Spigot 1
A2	Spigot 2
A3	Spigot 3
A4	Spigot 4
A5	Spigot 5
A6	Spigot 6
A7	Spigot 7
A8	Spigot 8
A9	Spigot 9
A10	Spigot 10
A11	Spigot 11
A12	Spigot 12

50GbE IPI50 Input Fin

Signals supported over RTP stream per input Fin Module. 2 x 50GbE QSFP Cages.

SMPTE 2110-20
3x 12Gbps Format Sources (ST2110-20/30/40)

SMPTE 2022-6
12x 1.485Gpbs Format Sources
12x 2.970Gpbs 1080p Format Sources

VSF TR-03 (SMPTE 2110)
12x 1.485Gpbs Format Sources
12x 2.970Gpbs 1080p Format Sources

SMPTE 2022-7
12x 1.485Gpbs Format Sources
12x 2.970Gpbs 1080p Format Sources

SMPTE 2042 (VC-2)
12x 1.485Gpbs Format Sources
8x 2.970Gpbs 1080p Format Sources

Ethernet Signals
QSFP + Optical 2x 50G Ethernet
Conforms to IEEE 802.3ba – 50Gigabit over fiber.
QSFP + connected Cable 2x 50Gigabit Ethernet over twin axial cables.

2x 50GbE QSFP Cages

Not Currently Used

1x RJ45 Network Port

Input Configuration		
Kahuna Input	**IPI50 Spigot**	**UHD Single Link**
A1	Spigot 1	UHD Spigot 1
A2	Spigot 2	
A3	Spigot 3	
A4	Spigot 4	
A5	Spigot 5	UHD Spigot 2
A6	Spigot 6	
A7	Spigot 7	
A8	Spigot 8	
A9	Spigot 9	UHD Spigot 3
A10	Spigot 10	
A11	Spigot 11	
A12	Spigot 12	

Using the IPI Menus

To get to the IPI menus, in the "**Engineering Config - Input Setup**" menu, in the "I**nput Standard**" menu touch the **{IPI...}** menu link button.

Note: The IPI and IPO menus will only be active if IPI and IPO Fins are fitted to the Kahuna mainframe.
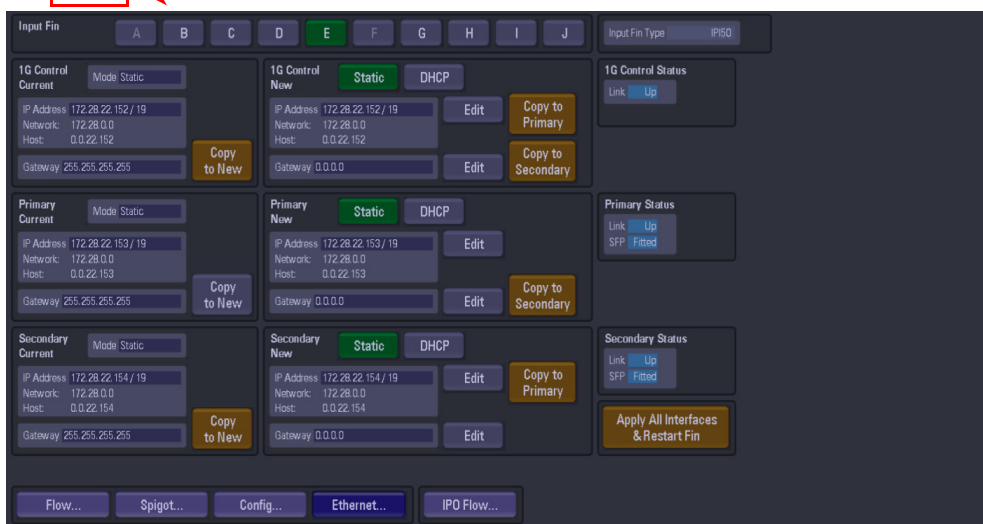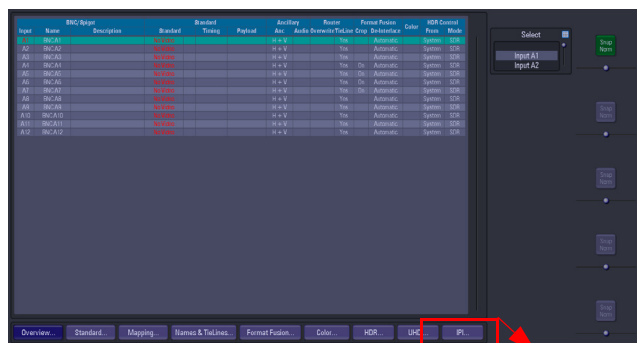
Ethernet Menu (above)

At the top of the menu, use the "**IP Input Fin**" buttons A to J to select the Fin that is going to be setup. The Fin letters A to J correspond with the Fin ports at the rear of the mainframe. The **Ethernet** menu is used to setup the IP addresses for the following:

- 1G Control - this is the IP address for the RJ45 network port on the IPI Fin
- Primary - this is the QSFP cage number 1
- Secondary - this is QSFP cage number 2

The IP addresses have to be setup for each Ethernet Interface set (1G Control, Primary and Secondary) for each IPI Fin. Once the IP address has been set for the 1G Control, touch the **{Copy to Primary/Secondary}** will copy the IP information to the Primary and Secondary sets. After using copy, it is necessary to modify the Primary and Secondary IP addresses to make sure that they are different. Typically, these are incremented by 1.
If an existing IP address exists, the user can touch the **{Copy to New}** button and the IP address info will be copied across to the "New" IP address box.

Once the IP addresses for the IPI Fin are set, touch the **{Apply All Interfaces & Restart Fin}**, this has to has to be done to restart the IPI Fin.

Flow Menu

The Flow menu allows the user to setup each individual "Spigot" IP address, Source IP address. Each Flow needs to have a Multicast IP address and Port as well as the IP address and Port of the source.

> Note: The menu below displays the "Spigot" buttons for a Fin in UHD Single Link mode. Spigot numbers will vary depending on the format the Fin is set to.

The number of Spigots that are available as inputs are restricted to the type of "**Flow Type**" that is selected. When selecting a Flow Type settings, refer to the number of channels listed in the "**Number of IP Inputs**" tables, as listed earlier in this section. This will display the number of inputs available to the selected Fin.

- **Flow 1** - This is used for **Video**
- **Flow 2** - This is used for **Audio**
- **Flow 3** - This is **Metadata**

The "**Links**" "**Primary**" and "**Secondary**" buttons allow separate data to be added for the Primary and Secondary Links.

The IP addresses, Port numbers and Flow Types can be entered manually, but there is a template tool which can be used to speed up the setup process.
Once the information is entered into the "**New**" data field, these settings are set as "**Current**" by touching the **{Apply Spigot}** button.

The IPI Flow Template, allows the user to set the Multicast IP address (this is user specific). The Source IP is the IP address of the incoming source.

When the information is input into the IPI Flow Template, set the "Multicast Increment" to increment by "1", the Template tool allows an address or port number to be incremented each time the **{Paste from Template}** button is touched.
For example enter the Multicast IP address - 120.14.10.01, then setting the increment to 1, then when the **{Paste from Template}** button is pressed, the Multicast IP address will increment by 1 automatically. This is handy and less time consuming if the user is setting up a lot of spigots.

This has to be done for each Flow for each Spigot.

These have to be setup for each spigot.
It is recommended "**Video Standard**" parameter is set to "**Auto**", which as suggested will automatically select the video standard for the selected spigot.
The "**Link Status**" window displays the incoming video standard, the number of audio channels and the metadata status.

Spigot Menu

In the Spigot menu, the user is able to set the video standard for individual Spigots using the "**Format**" parameter. Setting this parameter will allow more or less spigots to be used, depending on the type of format that is selected for the spigot.

> Note: The menu below displays the "Spigot" buttons for a Fin in UHD Single Link mode. Spigot numbers will vary depending on the format the Fin is set to.

The "**Streaming**" parameter will set whether there are 1 or 2 SFP cages being used on the selected IPI Fin.

The "**Audio Delay**" parameter can be adjusted, if for instance the "Lip Sync" is out between audio and video signals.

Make before Break - this sets up the new flow before breaking the old one. It should be noted that this will use extra band width as the new flow is established.

Break before Make - this simply breaks the old flow before setting up the new one. This will not result in a clean cut but will not use anymore bandwidth.

Config Menu

The Config menu allows the user to see the software/firmware versions and build, and change the current "DDS Domain ID".

> Note: In order to use VC2, the firmware for VC2 will need to be selected in this menu and the {Apply and Restart} button pushed which will reboot the Fin

The "UHD Link Enable" displays the four inputs linked together to create a UHD input. These are "Quad Link" indicators set in the "Eng Config - Input Setup - Standard" menu when in UHD mode.

- '1 - 4'
- '5 - 8'
- '9 - 12'

To insert a UHD SMPTE352 payload identifier into a video IP output stream, touch the "UHD SMPTE352 Insertion" **{Enable}** button.
This inserts the same timestamp information is inserted into each of the four 'quad-linked' video IP streams

> Note: The software on the IPI Fin has to be updated through RollCall either directly to the IPI FIN via the RJ45 Network port or directly to the SD card on the IPI Fin.

Use the "Firmware Type" parameter to select the firmware that you wish to run on the Fin. Each software version may contain multiple firmware images.
The correct firmware should be selected depending on the type of signals the IPI fin will be used for. i.e. SMPTE2022-6, ST2110, VC2 or 12G single link UHD. When selected, touch the **{Apply and Restart Fin}** button to restart the Fin in the selected firmware version. The number of spigots available depends on the type of firmware selected; ST2110 & SMPTE 2022-6 = 12 spigots, VC2 = 8 Spigots and Single link 12G "UHD" = 3 Spigots.

Stream Sync (Audio):-

- **Extended Headers** - Select to use extended headers in the RTP Audio stream.
- **RTP to PTP** - Select to synchronize RTP to PTP.
- **Nominal Delay** - Select to set up nominal delay at the spigot.

Stream Sync (Metadata):-

- **Extended Headers** - Select to use extended headers in the RTP Metadata stream.
- **RTP to PTP** - Select to synchronize RTP to PTP.
- **Nominal Delay** - Select to set up nominal delay at the spigot.
- **RTP** - Select to enable the use of RTP timestamps only to synchronize Metadata to video.

40GbE IPO40 Output Fin

Signals supported over RTP stream per output Fin Module with 2 x 40GbE QSFP Cages.

SMPTE 2022-6
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 12x 2.970Gpbs 1080p Format Sources

VSF TR-03 (SMPTE 2110)
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 12x 2.970Gpbs 1080p Format Sources

SMPTE 2022-7
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 12x 2.970Gpbs 1080p Format Sources

SMPTE 2042 (VC-2)
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 6x 2.970Gpbs 1080p Format Sources

4x SDI Output BNCs
Outputs 13 to 16

2x 40GbE SFP Cages
optional SFP Modules)

1x RJ45 Network Port

Not used
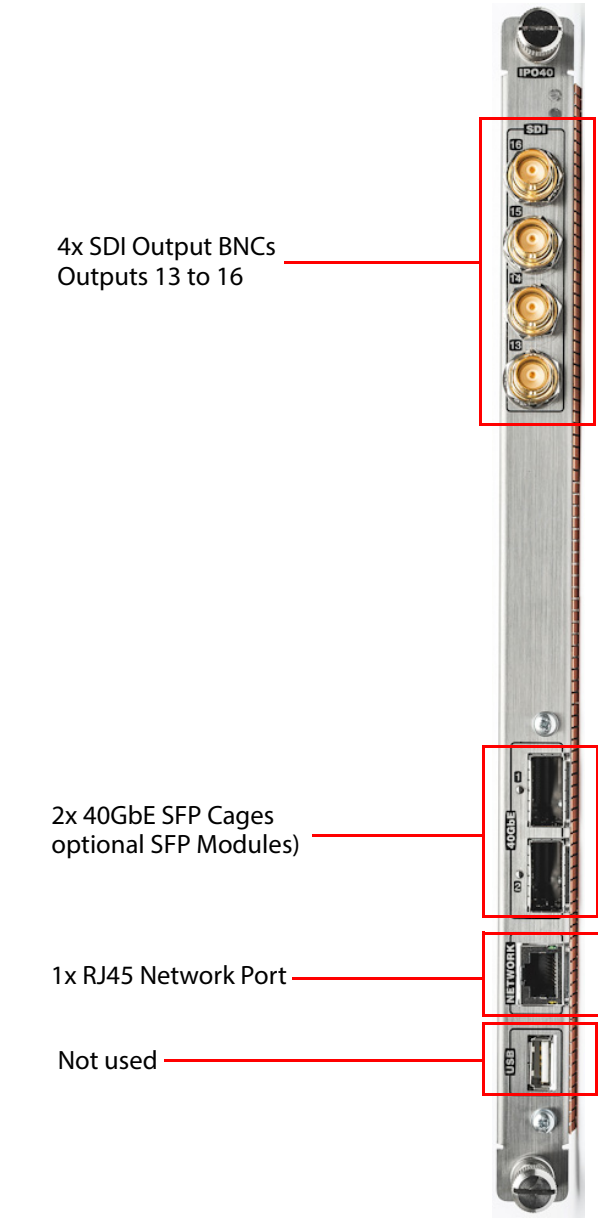
Output Configuration	
Kahuna Output	**IPO Spigot**
A1	Spigot 1
A2	Spigot 2
A3	Spigot 3
A4	Spigot 4
A5	Spigot 5
A6	Spigot 6
A7	Spigot 7
A8	Spigot 8
A9	Spigot 9
A10	Spigot 10
A11	Spigot 11
A12	Spigot 12
A13	BNC 13
A14	BNC 14
A15	BNC 15
A16	BNC 16

50GbE IPO50 Output Fin

Signals supported over RTP stream per output Fin Module with 2 x 50GbE QSFP Cages.

SMPTE 2110-20
4x 12Gbps Format Sources (ST2110-20/30/40)

SMPTE 2022-6
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 12x 2.970Gpbs 1080p Format Sources

VSF TR-03 (SMPTE 2110)
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 12x 2.970Gpbs 1080p Format Sources

SMPTE 2022-7
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 12x 2.970Gpbs 1080p Format Sources

SMPTE 2042 (VC-2)
Outputs - 12x 1.485Gpbs Format Sources
Outputs - 8x 2.970Gpbs 1080p Format Sources

Ethernet Signals
QSFP + Optical 2x 50G Ethernet
Conforms to IEEE 802.3ba – 50Gigabit over fiber.
QSFP + connected Cable 2x 50Gigabit Ethernet over twin axial cables.

2x 50GbE QSFP Cages

Note: The 50GbE IPO Fin can be configured in the following way, depending on the Firmware:
12x Spigots + 4x BNCs in 3G
or
16 Spigots in 3G
or
3x 12G Spigots + 4x BNCs
or
4x 12G Spigots

4x SDI Output BNCs
Outputs 13 to 16

1x RJ45 Network Port
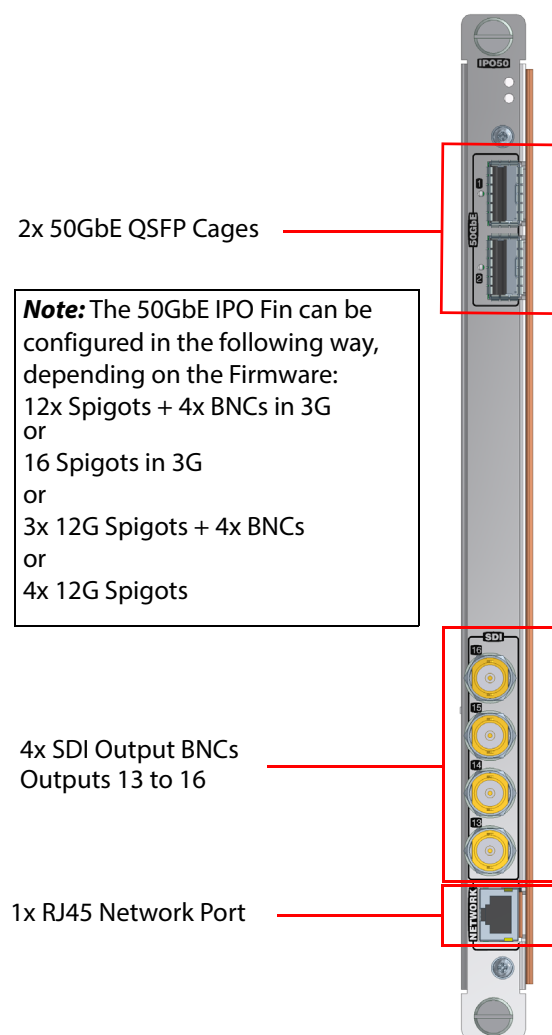
Output Configuration		
Kahuna Output	**IPO Spigot**	**UHD Single Link**
A1	Spigot 1	UHD Spigot 1
A2	Spigot 2	
A3	Spigot 3	
A4	Spigot 4	
A5	Spigot 5	UHD Spigot 2
A6	Spigot 6	
A7	Spigot 7	
A8	Spigot 8	
A9	Spigot 9	UHD Spigot 3
A10	Spigot 10	
A11	Spigot 11	
A12	Spigot 12	
A13	BNC 13	UHD Spigot 4
A14	BNC 14	
A15	BNC 15	
A16	BNC 16	

Using the IPO Menus

To get to the IPO menu, touch the **{IPO Setup...}** menu link button.

Note: The IPI and IPO menus will only be active if IPI and IPO Fins are fitted to the Kahuna mainframe.

Ethernet Menu (above)

At the top of the menu, use the "**IP Output Fin**" buttons A to D to select the Fin that is going to be setup. The Fin letters A to D correspond with the output Fin ports at the rear of the mainframe.
The **Ethernet** menu is used to setup the IP addresses for the following:

- 1G Control - this is the IP address for the RJ45 network port on the IPO Fin
- Primary - this is the SFP cage number 1
- Secondary - this is SFP cage number 2

The IP addresses have to be setup for each Ethernet Interface set (1G Control, Primary and Secondary) for each available IPO Fin. Once the IP address has been set for the 1G Control, touch the **{Copy to All 1G}** will copy the IP information to the Primary and Secondary sets. After using copy, it is necessary to modify the Primary and Secondary IP addresses to make sure that they are different. Typically, these are incremented by 1.

If an existing IP address exists, the user can touch the **{Copy to New}** button and the IP address info will be copied across to the "New" IP address box.

Once the IP addresses for the IPO Fin are set, touch the **{Apply All Interfaces & Restart}**, this has to has to be done to restart the IPO Fin.

Flow Menu

The Flow menu allows the user to setup each individual "**Spigot**" IP address, Source IP address. Each Flow needs to have a Multicast IP address and Port as well as the IP address and Port of the source.

> Note: The menu below displays the "Spigot" buttons for a Fin in UHD Single Link mode. Spigot numbers will vary depending on the format the Fin is set to.

The number of Spigots that are available as outputs are restricted to the type of "**Flow Type**" that is selected. When selecting a Flow Type settings, refer to the number of channels listed in the "**Number of IP Outputs**" tables, as listed earlier in this section. This will display the number of inputs available to the selected Fin.

The "**Links**" "**Primary**" and "**Secondary**" buttons allow separate data to be added for the Primary and Secondary Links. The IP addresses, Port numbers and Flow Types can be entered manually, but there is a template tool which can be used to speed up the setup process. Once the information is entered into the "**New**" data field, these settings are set as "**Current**" by touching the **{Apply Spigot}** button. This has to be done for each Flow for each Spigot

The IPO Flow Template allows the user to set the Multicast IP address (this is user specific). The Source IP is the IP address of the incoming source.
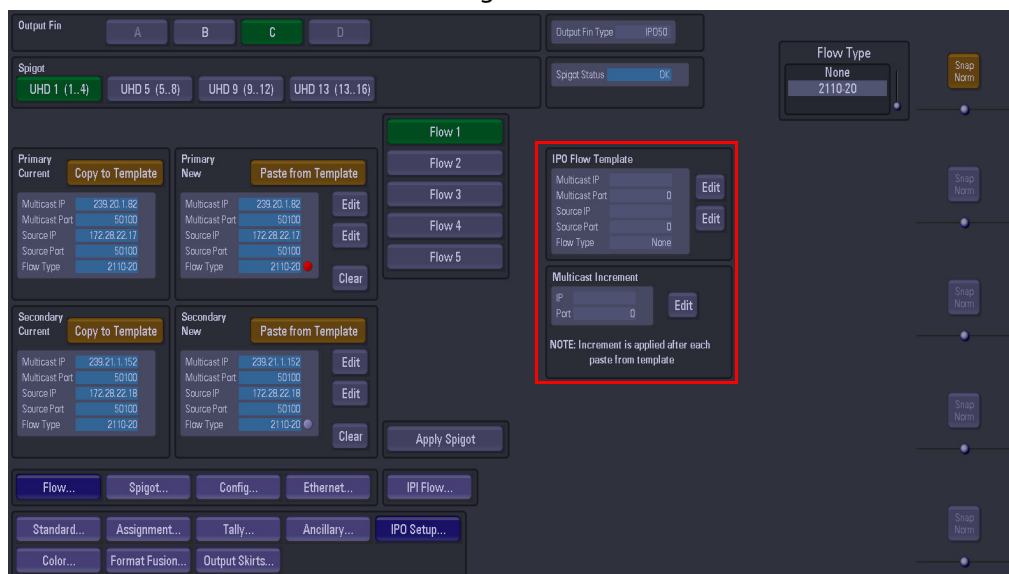
When the information is input into the IPO Flow Template, set the "Multicast Increment" to increment by "1", the Template tool allows an address or port number to be incremented each time the **{Paste from Template}** button is touched.
For example enter the Multicast IP address - 120.14.10.01, then setting the increment to 1, then when the **{Paste from Template}** button is pressed, the Multicast IP address will increment by 1 automatically. This is handy and less time consuming if the user is setting up a lot of spigots.

This has to be done for each Flow for each Spigot.

> Note: The configuration of the Spigot dictates the type of signal carried on each of the Flows.

This has to be done for each Flow for each Spigot.

If a Spigot is capable of utilizing a VC2 Flow, the Flow configuration is as follows:

- Flow 1 - Video (either SMPTE 2022-6, or ST2110-20 or VC2)
- Flow 2 - this is Audio
- Flow 3 - this is Metadata
- Flow 4 - this is None

These have to be setup for each spigot.
The "Spigot Status" window displays the incoming video standard.

The "Current" and "New" allow the user to copy the Multicast IP address etc. to the "Edit Template" menu from the "Current" area and paste from the "Edit Template" menu to the "New" area.

If a Spigot is not configured for VC2, the Flows are as follows:

- Flow 1 - this is SMPTE 2022-6
- Flow 2 - this is ST2110-20
- Flow 3 - this is Audio
- Flow 4 - This is Metadata

Spigot Menu

In the Spigot menu, the user is able to set the video standard for individual Spigots using the "**Format**" parameter. Setting this parameter will allow more or less spigots to be used, depending on the type of format that is selected for the spigot.

> Note: The menu below displays the "Spigot" buttons for a Fin in UHD Single Link mode. Spigot numbers will vary depending on the format the Fin is set to.

The "**Streaming**" parameter will set whether there are 1 or 2 SFP cages being used on the selected IPO Fin.

The **Test Pattern** attacher is able to output a Color Bar signal test pattern on the selected Spigot.
Video Caption - allows the user to place text onto the test pattern. The caption also appears on any video when not in TPG mode

Video Standard - allows the user to set the video standard of the test pattern.

Audio Frequency - sets the audio frequency of the test signal.

Config Menu

The Config menu allows the user to change the current "DDS Domain ID".

The "UHD Link Enable" displays the four inputs linked together to create a UHD input. These are "Quad Link" indicators set in the "Eng Config - Output Setup - Standard" menu when in UHD Quadrant mode.

- '1 - 4'
- '5 - 8'
- '9 - 12'

To insert a UHD SMPTE352 payload identifier into a video IP output stream, touch the "UHD SMPTE352 Insertion" **{Enable}** button.
This inserts the same timestamp information is inserted into each of the four 'quad-linked' video IP streams

---

Note: The software on the IPO Fin has to be updated through RollCall either directly to the IPO FIN via the RJ45 Network port or directly to the SD card on the IPO Fin.

Use the "Firmware Type" parameter to select the firmware that you wish to run on the Fin. Each software version may contain multiple firmware images.
The correct firmware should be selected depending on the type of signals the IPI fin will be used for. i.e. SMPTE2022-6, ST2110, VC2 or 12G single link UHD. When selected, touch the **{Apply and Restart Fin}** button to restart the Fin in the selected firmware version. The number of spigots available depends on the type of firmware selected; ST2110 & SMPTE 2022-6 = 12 spigots, VC2 = 8 Spigots and Single link 12G "UHD" = 3 Spigots.

Stream Sync (Audio):-

- **Extended Headers** - Select to use extended headers in the RTP Audio stream.
- **RTP to PTP** - Select to synchronize RTP to PTP.
- **Nominal Delay** - Select to set up nominal delay at the spigot.

Stream Sync (Metadata):-

- **Extended Headers** - Select to use extended headers in the RTP Metadata stream.
- **RTP to PTP** - Select to synchronize RTP to PTP.
- **Nominal Delay** - Select to set up nominal delay at the spigot.
- **RTP** - Select to enable the use of RTP timestamps only to synchronize Metadata to video.

FormatFusion4^{TM} - HDR Overview

Note: You will only be able to use the HDR and SDR settings if you have a FormatFusion4^{TM} option license. If you would like to upgrade your Kahuna, please contact Grass Valley Service Support.

The introduction of FotmatFusion4^{TM}, gives Kahuna the ability to convert from SDR to HDR or from HDR to SDR.

FormatFusion4 also allows conversion between most commonly used HDR formats. HDR (High Dynamic Range) is the ability to display a wider and richer range of Colors, much brighter whites, and much deeper, darker blacks. This gives the video content a more 'dynamic' look, which is where the name comes from.

HDR content preserves details in the darkest and brightest areas of a picture that are lost using older standards like Rec.709. It also allows for more natural, true-to-life Colors that are closer to how we see them in real life.

The HDR element within the Kahuna supports the Electrical Optical Transfer Functions (EOTF) for:

- Perceptual Quantizer (PQ) SMPTE ST-2084
- Hybrid Log-Gamma (HLG) ARIB STD-B67
- Sony's Slog3 profile
- Arri LogC3
- Arri LogC2
- S-Log3L
- HLG (ITU-R BT.2100)

Also Kahuna supports Wide Color Gamuts (WCG):

- BT 709
- BT 2020
- S-Gamut3
- DCI-P3
- Arri Wide

The Kahuna Platform will allow a combination of the declared EOTFs and WGCs above.
The above will be explained in detail on the next page.

Passing HDR without FormatFusion4

If your system does not have FormatFusion4, it is still possible for a Kahuna to pass HDR signals through it without any conversion.
If you are using a Kahuna in this way it is important to ensure that the System SDR / HDR setting is correct so that the output video always has the correct SDR or HDR payload.

On the GUI, navigate to Eng Config > System Standard (Menu 8731).
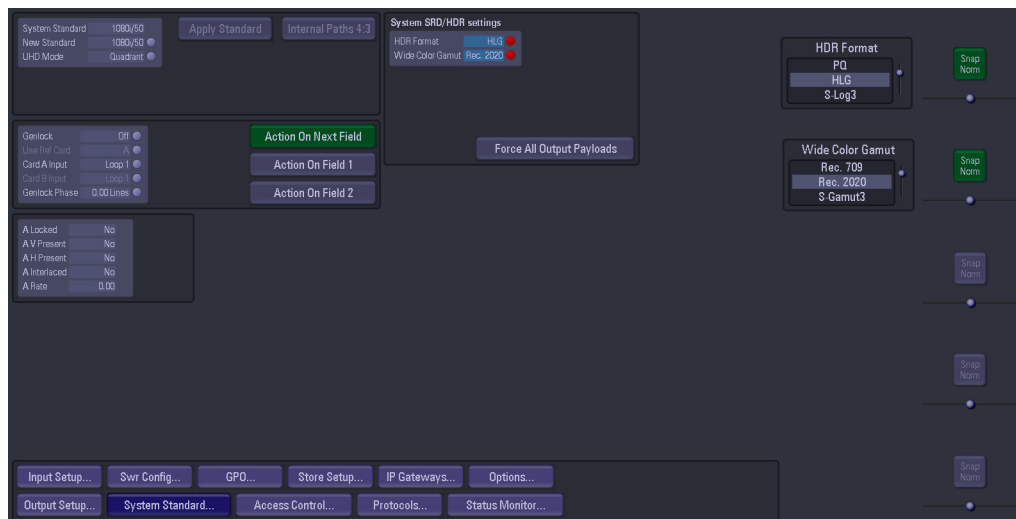
The System SDR / HDR settings set the standard which will be used by all video passing through the M/E banks and/or DVEs. It also sets the standard for internally generated sources such as Mattes.

> Note: This will not cause any conversion of the video signal, it simply ensures the Payload is correct on the output.

Any video fed directly to an output (not passing through an M/E bank or DVE) will retain its original payload unless the "Force All Output Payloads" parameter is lit. If this is lit, the video from all outputs will always have the payload determined by the System SDR / HDR settings. Kahuna systems with a FormatFusion4 license will not see this setting.

This applies for Kahuna software release 9.2r3 onwards.

Supporting HDR in the Kahuna 9600, 6400 Architecture

With FormatFusion4, Kahuna can support HDR on every Input and every Output independently, as well as setting the 'Standard' of the Switcher to have a desired EOTF and WCG. The input stage will convert to the standard EOTF and WCG, and the outputs will convert from the standard settings.
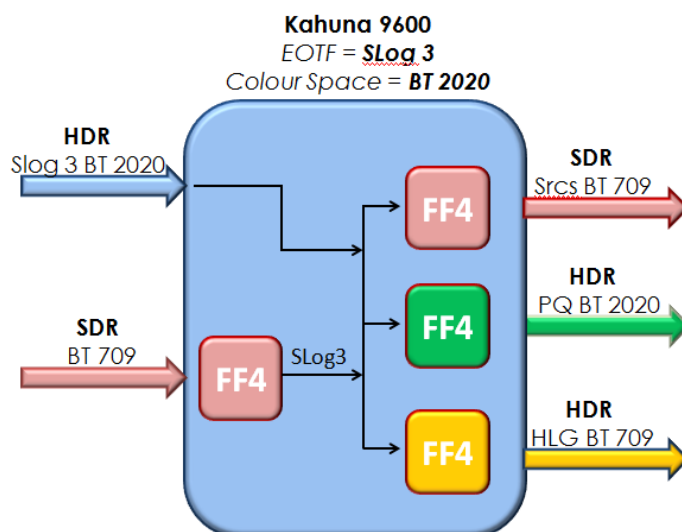
This example shows the Kahuna Switcher's standard is set to SLog3, color space is BT 2020. SDR inputs are converted to Slog3 and the outputs are converted from this respectively.

Using HDR on Kahuna

This section of the manual will outline how to setup HDR on the Soft MLC GUI.

System Standard

The first step is to decide what video format the system will be working in and what video standard the outputs will be set to. To get to the System Standard menu, touch the **{ENG CONFIG}** button, then touch the **{System Standard...}** button.
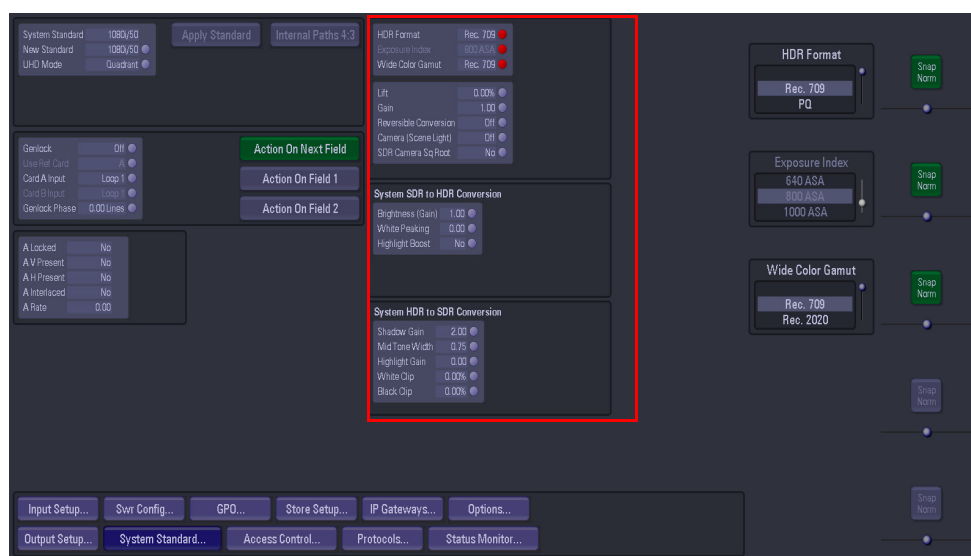
Touch the "HDR Format" attacher and the "Wide Color Gamut" parameter controls are displayed. Here the user can set the system standard to be a SDR (standard dynamic range) standard, or a HDR standard.

> Note: If the outputs are going to be set as SDR outputs (1080p or UHD), then set the system standard to a 1080p standard or UHD Quadrant or 2SI mode. Set the HDR Format parameter to "Rec. 709" and set the Wide Color Gamut parameter to "Rec. 709". If the outputs are going to be HDR outputs, then set the HDR Format parameter and the Wide Color Gamut parameter to the required HDR settings.

HDR Formats on Kahuna

Rec. 709 - Standard Dynamic Range (SDR)
Standard Dynamic Range signals as per ITU-R BT.709-6

PQ - Dolby Perceptual Quantizer
The Dolby PQ curve aims to cover up to 10,000 nits, code words are equally spaced in perceived brightness over this range. PQ is display referenced so code words equate to specific screen brightness.

HLG (Arib)
Hybrid Log Gamma, as per ARIB-STD-B67
This assumes diffuse white at 50% signal.
This is for legacy compatibility - use HLG below

S-Log3 - Sony S-Log3

This is a Sony proprietary format. Scene referenced almost pure log curve. S-Log3 is a production format only and would not be broadcast.

S-Log3 and Dolby PQ have a similar amount of headroom with HLG having slightly less.

Arri LogC 3 and LogC 2

This is an Arri production standard.
Note the additional 'Exposure Index' control.

S-Log3L

S-Log3 soft clipped to 4000nits

HLG - Hybrid Log Gamma

Developed by the BBC and NHK, part traditional gamma and part log curve. This gives a degree of back compatibility on SDR screens.
A consequence of this back compatibility is the Hybrid Log Gamma covers slightly less range than the Dolby PQ or S-Log3 curves by a few 'stops'.
HLG is scene referenced so is defined by scene light levels rather than output display levels.

Wide Color Gamut

The color gamut or Color space of a signal defines the range of colors that signal can represent. The diagram below shows all the Colors visible to the human eye, any color space using three primaries forms a triangle in this diagram. The inner triangle below shows the Colors achievable with the traditional Rec. 709 gamut. The new wide Color gamut space is show by the outer triangle which encompasses much more of the visible Colors.

Wide Color Gamut Formats on Kahuna

"Rec. 709" - Standard Color Gamut

Traditional Color space as per ITU-R BT.709-6

"Rec. 2020" - Wide Color Gamut

Wide Color space as per ITU-R BT.2020. This is the new broadcast format.

"S-Gamut3" - Sony Wide Color Gamut
This is a Sony proprietary production format.

DCI-P3
Digital Cinema Standard supported by some monitors.

Arri Wide
Arri production standard.
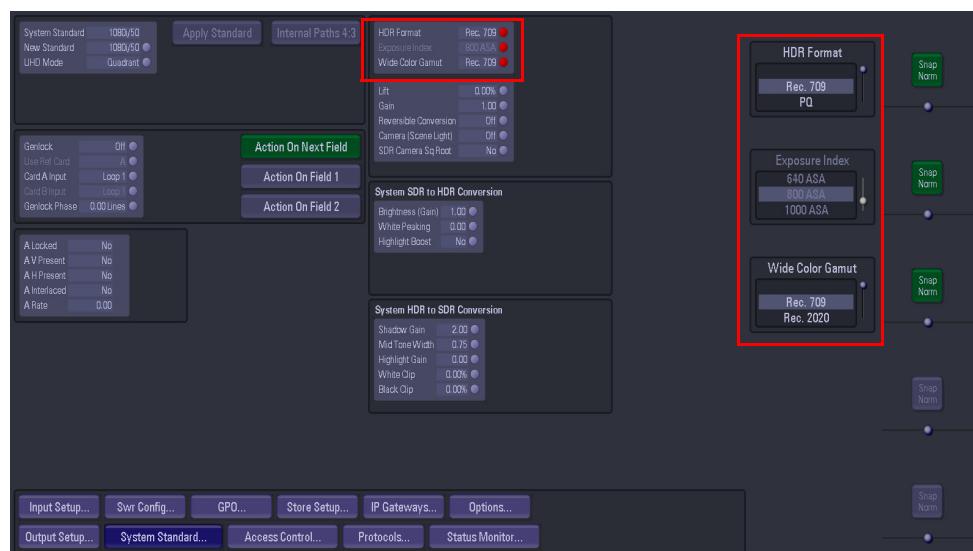
Parameters

HDR Format - sets the HDR Format

Exposure Index - this is only relevant for Arri 'Log C' type curves.
Arri 'Log C' is actually a set of curves dependent on the cameras sensitivity (ASA) or 'Exposure Index' setting.
By setting the camera's Exposure Index on Kahuna the correct curve will be used and the Log C code values will always represent the same scene brightness levels even if different scenes are shot at different exposure indices.

Wide Color Gamut - sets the required WCG

Reversible Conversion - The System HDR/SDR conversion can be forced to be reversible. This means when converting SDR to HDR and subsequently converting that HDR back to SDR you will get back to your original SDR signal. There is then only one set of conversion controls as the SDR to HDR conversion is the opposite of the HDR to SDR. This ensures correct 'round tripping' but will compromise the flexibility of conversions.

Camera (Scene Light) - All HDR conversion is done via a 'Linear Light' stage. This 'Linear Light' stage can either represent the real world light coming into the camera (the 'Scene' light) OR the light coming out of a display monitor (the 'Display' light).

- 'Camera (Scene Light)' mode 'On' will convert via 'Scene' light.
- 'Camera (Scene Light)' mode 'Off' will convert via 'Display' light.

If your source is coming directly from a camera then 'Camera' mode should be 'On'.
If your source is pre-packaged material from a server, such as adverts, 'Camera' mode should be 'Off'.

SDR Camera Sq Root - This controls the equation used to convert from Rec. ITU-R BT.709 SDR content to Linear scene light.

- Selecting 'No' will use the formulas defined in the Rec. ITU-R BT.709 specification.
- Selecting 'Yes' will use a square root function that can better match the OETF actually used in cameras (this may give improved performance in the blacks).

Brightness Gain - controls the HDR brightness

White Peaking - lifts high luminance areas to enhance the highlights in the SDR image and make the HDR version look less 'flat'.

To SDR Shadow Gain - adjusts the Gain, Highlight Gain & Mid Tone
To SDR Mid Tone Width - defines the Luma region where a curve joins the two gains.
To SDR Highlight Gain- controls the gain at high Luma levels.
To SDR White Clip- sets White Hard Clip Level.
To SDR Black Clip- sets Black Hard Clip Level.

Input Setup

In the "**Eng Config - Input Setup**" menu, touch the **{HDR…}** button.
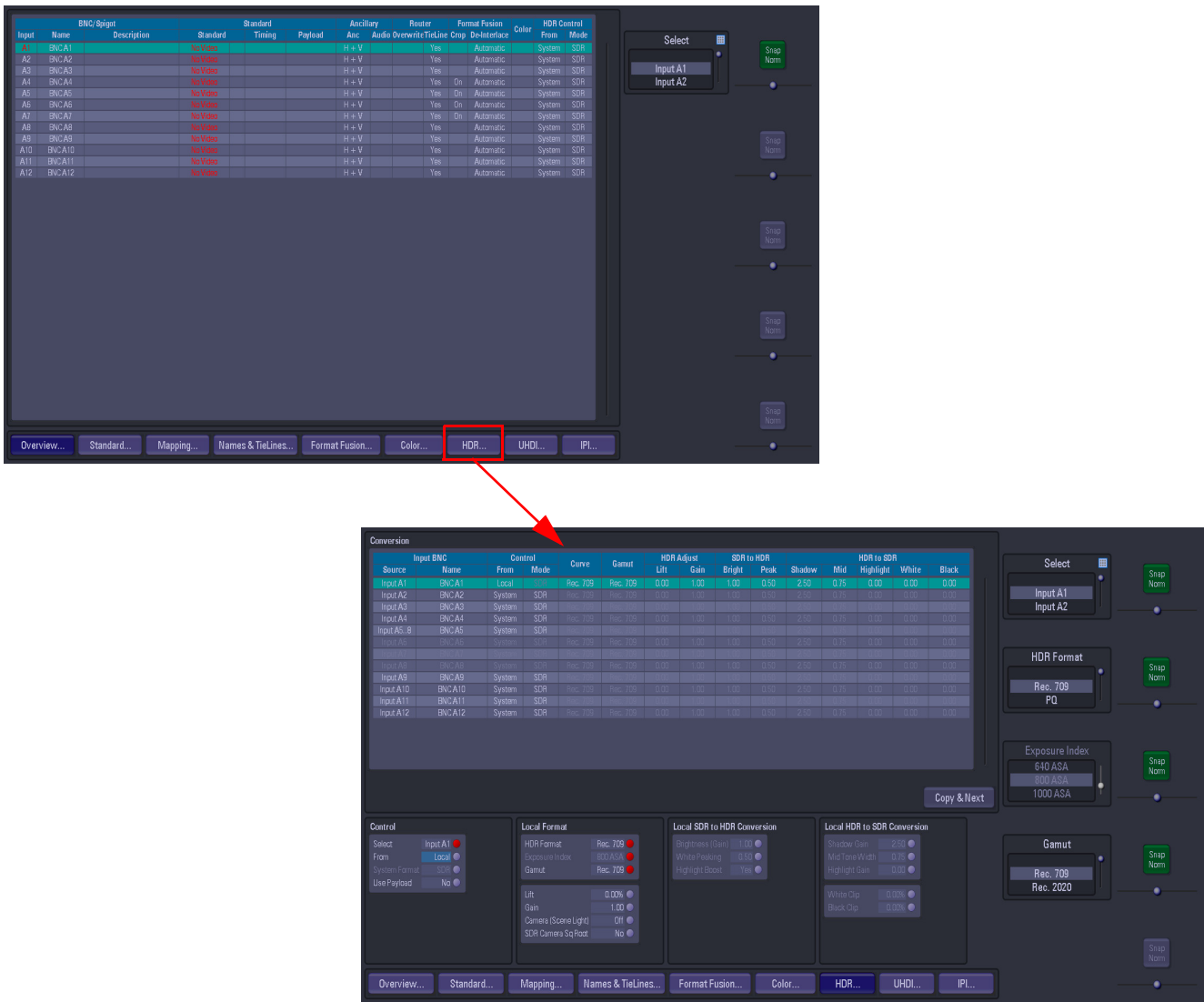
Inputs are setup on an individual input by input basis. When the system standard is set to SDR or HDR, each input has to be setup in the Input HDR menu to the required HDR or SDR format. The incoming source is setup using the "Conversion" parameters.

> Note: These parameters do not automatically follow the System Standard settings.

The **HDR Format** and **Gamut** "Conversion" parameters in the Input HDR menu have to be set to the same standard as the incoming source.

For example: If the incoming source is a HDR source and the System Standard is set to one of the HDR settings (e.g. HDR Format = S-Log3, Wide Color Gamut = Rec. 2020) then the incoming source has to be set to the required standard using the Conversion "HDR Format" and the "Gamut" parameters.
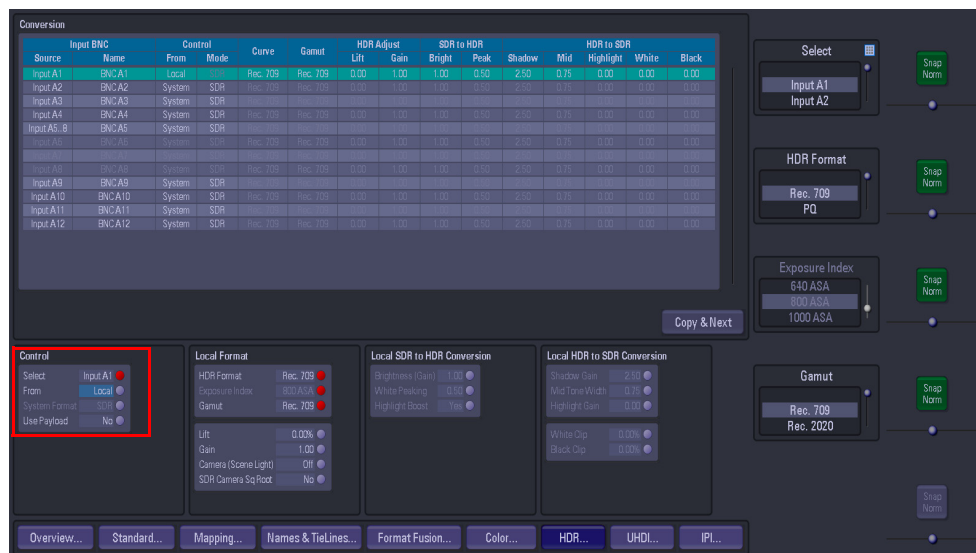
"Lift" will be the only other parameter that is adjustable.
This should normally be set to zero, however additional lift adjustment may be required to correct the apparent black level during conversions. This is particularly true for S-Log3 where the defined black level is not always adhered to in practice.

Keying

Lift may also need adjustment with linear keying to ensure there is no change in background level when turning a key layer on and off.

For example: If the incoming source is a HDR source and the System Standard is set to 1080p (e.g. HDR Format = Reg. 709, Wide Color Gamut = Rec. 709) Set the "Conversion" parameters to match the incoming source format.
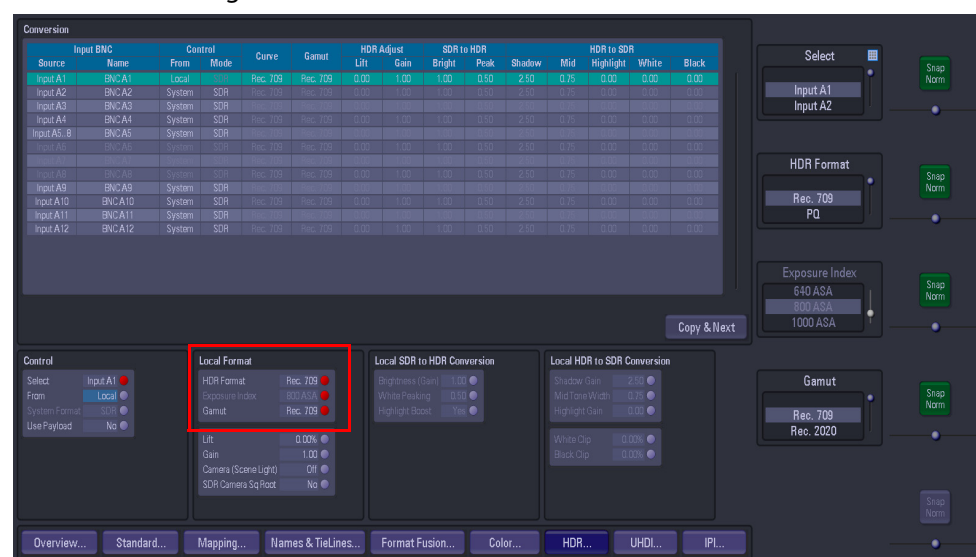
The parameters available to the user are the down conversion parameters to an SDR format.

HLG Gain

When converting from PQ or Slog3 to HLG on an output the system will allow additional gain to be applied. This is to compensate for the extra range or stops that S-Log3 supports over HLG which would otherwise give dark pictures.

SDR to HDR Parameters

Kahuna uses a spatially constant transfer curve to convert SDR to HDR. In its simplest form this maps SDR brightness range 0-100nits to the bottom end of the HDR brightness range (nominally 0-1000nits). Kahuna allows control over the gain required to do this which changes the overall brightness of the HDR image. This is the 'SDR to HDR' - 'Bright' control.
In addition some gentle peaking can be included to lift high luminance areas to enhance the highlights in the SDR image and make the HDR version look less 'flat'. This is the 'SDR to HDR' - 'Peak' control. A value of 0.0 gives a pure linear conversion and 1.0 gives maximum enhancement.
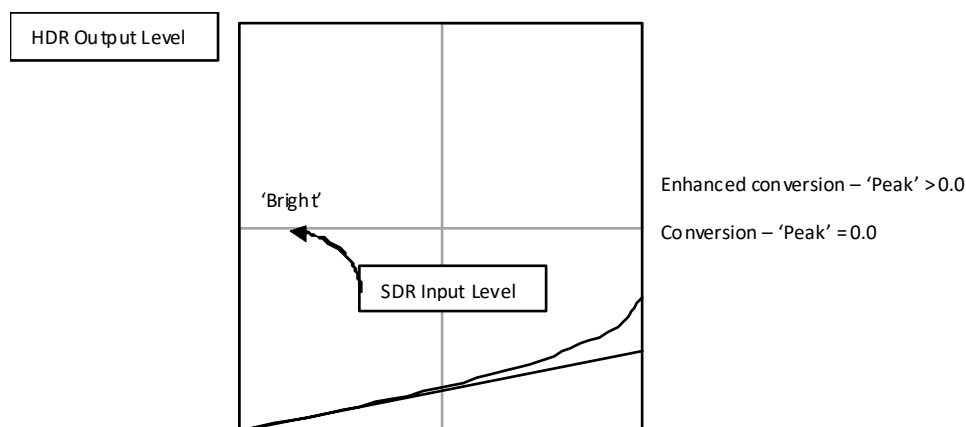
HDR Output Level

'Bright'

SDR Input Level

Enhanced conversion – 'Peak' > 0.0

Conversion – 'Peak' = 0.0

Exposure Index
This is only relevant for Arri 'Log C' type curves.
Arri 'Log C' is actually a set of curves dependent on the cameras sensitivity (ASA) or 'Exposure Index' setting.
By setting the camera's Exposure Index on Kahuna the correct curve will be used and the Log C code values will always represent the same scene brightness levels even if different scenes are shot at different exposure indices.

HDR to SDR Parameters

This conversion employs gain and soft clipping of the HDR version. HDR content is processed in two stages.

1: White and Black Offset
The 'White' and 'Black' parameters define the amount of black levels or white levels that are to be hard clipped away and the resultant range stretched out. This will enhance contrast of the SDR image at the cost of crushing the blacks and or whites.

2: Tone Mapping Curve
The remaining range of HDR brightness levels are then tone mapped into the SDR range. Two gains are defined one for the lower luminance levels, the 'Shadow Gain' and one for the peak luminance levels, the 'Highlight Gain'. The transition between these two gains is defined over a range called the 'Mid Tone Width'. This gives adjustable soft clipping; the 'Shadow Gain' should be used to control the overall SDR image 'brightness'. The 'Highlight Gain' and 'Mid Tone Width' should be used to bring down the HDR highlights while retaining some detail within them if desired.
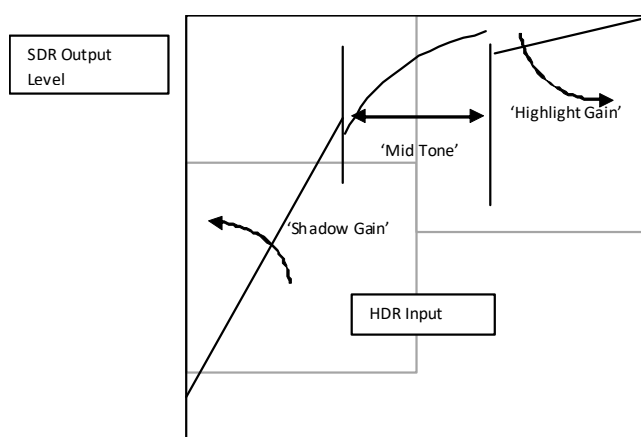
HDR To SDR conversion parameters:
HDR To SDR Shadow Gain - adjusts the Gain, Highlight Gain & Mid Tone
HDR To SDR Mid Tone Width - defines the Luma region where a curve joins the two gains.
HDR To SDR Highlight Gain- controls the gain at high Luma levels.
HDR To SDR White Clip- sets White Hard Clip Level.
HDR To SDR Black Clip- sets Black Hard Clip Level.

Store Setup

In the **Store - FormatFusion** menu, the user needs to tell the system what format the selected still is set to. This is done using the **HDR/WCG** parameters.
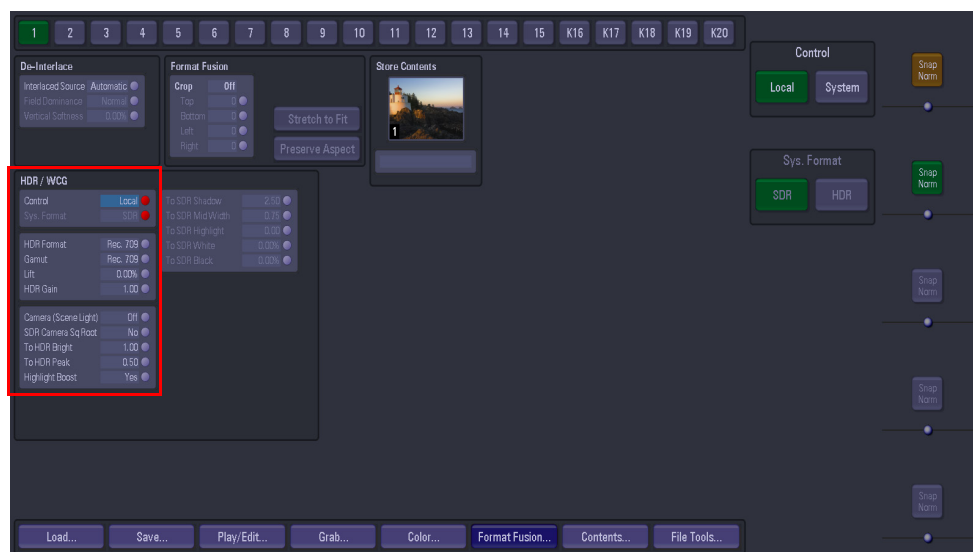
The user will have the ability to down convert a HDR still to SDR, or up-convert an SDR (Rec. 709) still to a HDR format using the "To **HDR Bright"** and "**To HDR Peak"** parameters.
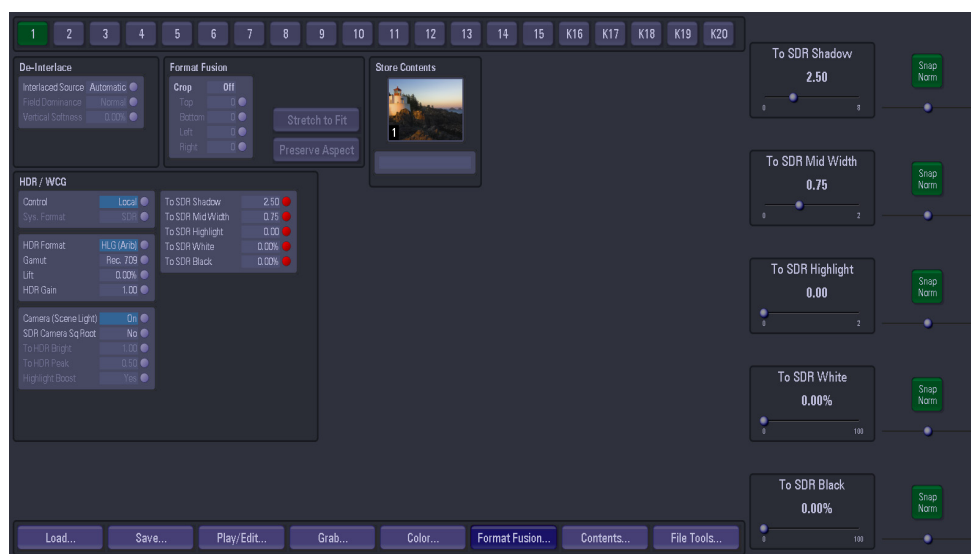
As with the Input and Output menus, the "To SDR" parameters allow the user to down convert the selected still.

Output Setup

In the **Eng Config - Output Setup** menu, touch the **{Standard…}** button, then in the Input Standard menu, touch the **{HDR}** button.
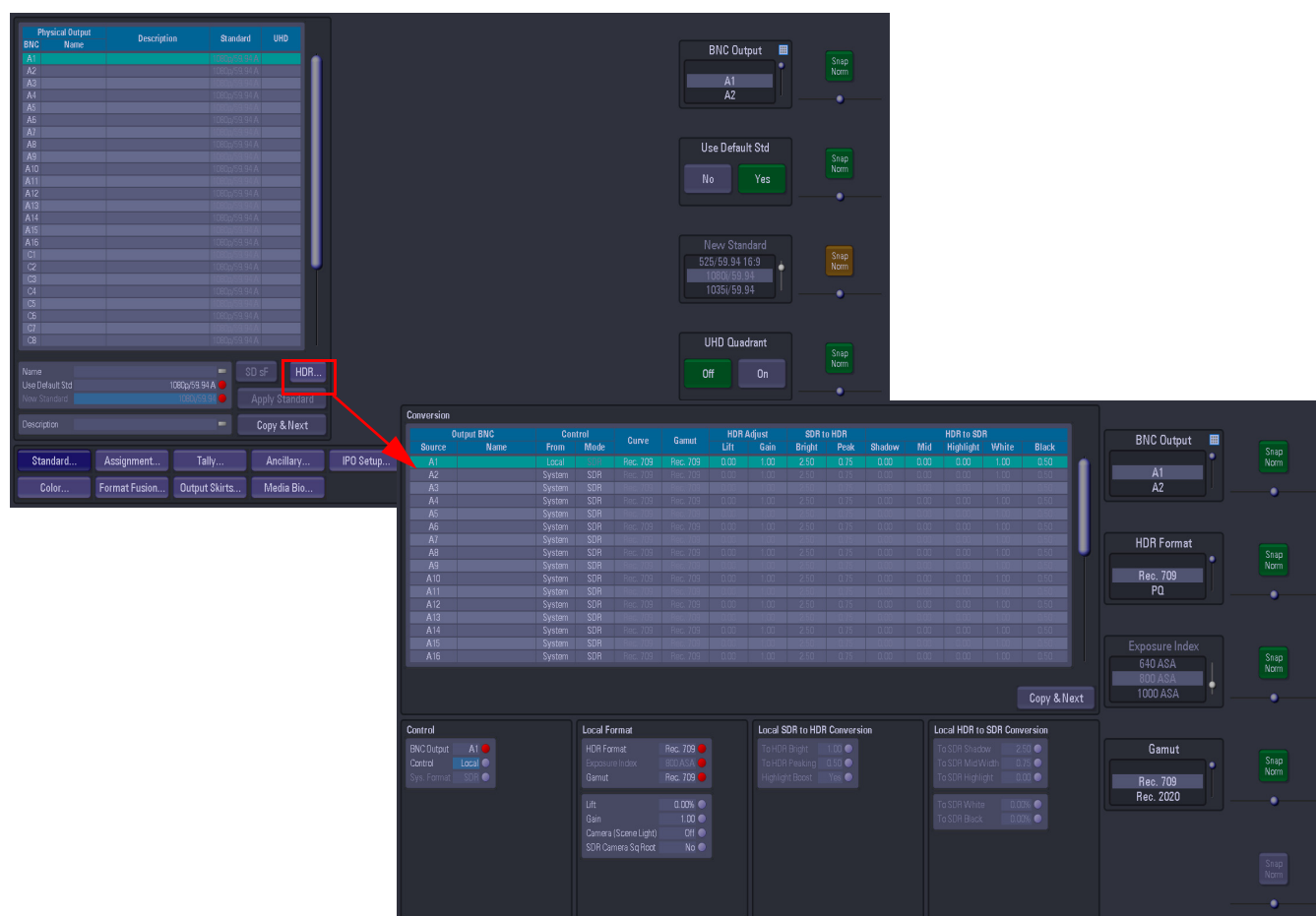
Outputs are setup on an individual output by output basis. As with the inputs, when the system standard is set to SDR or HDR, each output has to be setup in the Output HDR menu to the required HDR or SDR format. The output source is setup using the "Conversion" parameters.

> Note: These parameters do not automatically follow the System Standard settings.

The **HDR Format** and **Gamut** "Conversion" have to be set for each output.

For example: If the output source is a HDR source and the System Standard is set to one of the HDR settings (e.g. HDR Format = S-Log3, Wide Color Gamut = Rec. 2020) then the output source has to be set to the required standard using the Conversion "HDR Format" and the "Gamut" parameters.
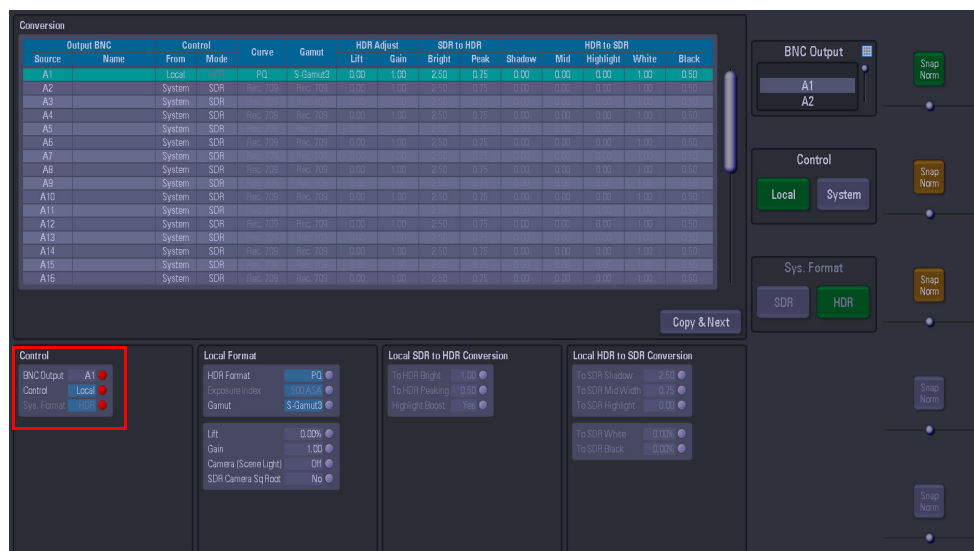
"Lift" will be the only other parameter that is adjustable.
This should normally be set to zero, however additional lift adjustment may be required to correct the apparent black level during conversions. This is particularly true for S-Log3 where the defined black level is not always adhered to in practice.

For example: If the output source is a HDR source and the System Standard is set to 1080p (e.g. HDR Format = Reg. 709, Wide Color Gamut = Rec. 709) Set the "Conversion" parameters to match the output source format.
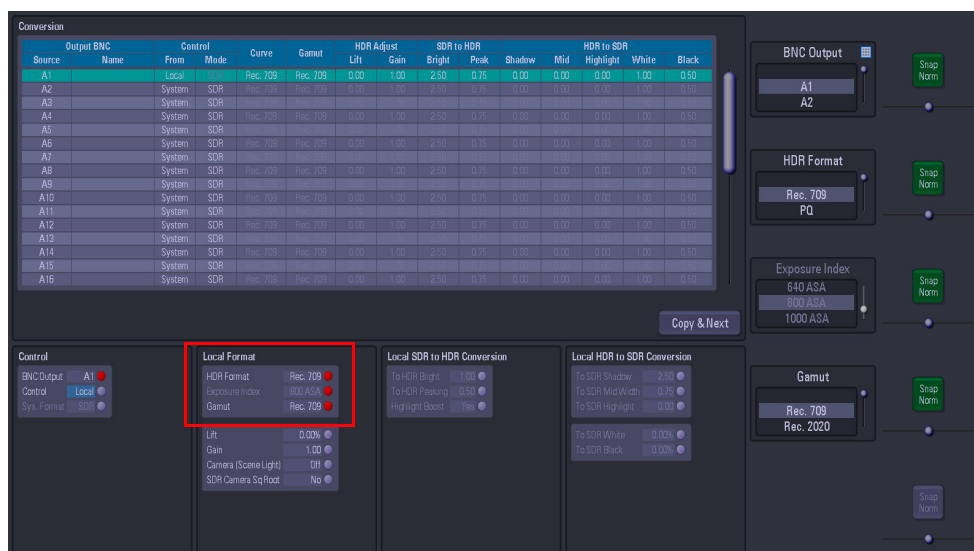
The parameters available to the user are the down conversion parameters to an SDR format and are the same as the input parameters.

How to Use HDR on Kahuna

> Note: The information below shows the user how to setup HDR using the MAV-GUI menus. This information can be applied to the Soft MLC menus in exactly the same way.

What format do you want to work in? SDR or HDR

The first thing to setup is the "**System Standard**", this will allow the user to setup the internal system HDR/WCG format using the "**HDR Format**" and "**Color Gamut**" parameters. The switcher, inputs and stores are converted to this format and outputs are converted from this format.

Working in HDR - If the user is making a HDR production, the system standard; HDR Format parameter will need to be set to one of the HDR formats, ideally this will be the format of the majority of your sources.

For example - if using Sony cameras running in S-Log3, the system standard 'HDR Format' should also be 'S-Log3'. Outputs can then be set to a broadcast HDR format as required.

Similarly if making a Wide Color production, the system standard 'Color Gamut' must be set to a wide gamut either 'Rec. 2020' or 'S-Gamut3'. Outputs can then be set to a broadcast gamut as required.

Working in SDR - If making an SDR only production but have a few HDR sources, the switcher should be in SDR (system HDR format of 'Rec. 709') and those HDR inputs will then be down converted at the input.

HDR Input Scenario - SDR to HDR or HDR to SDR Inputs?

In the Engineering Config - Input Setup menu, the user will need to set each individual input to the system HDR/WCG format (as set in the System Setup menu). Kahuna needs to be told the HDR format and Color gamut of any input being used.
If an input is SDR and the system standard is HDR the input '**SDR to HDR**' parameter controls will be lit and active, allowing adjustment of the conversion process.
If an input is HDR and the system standard is SDR the input '**HDR to SDR**' controls will be active. Use the parameter controls to setup the selected input to the required picture quality.
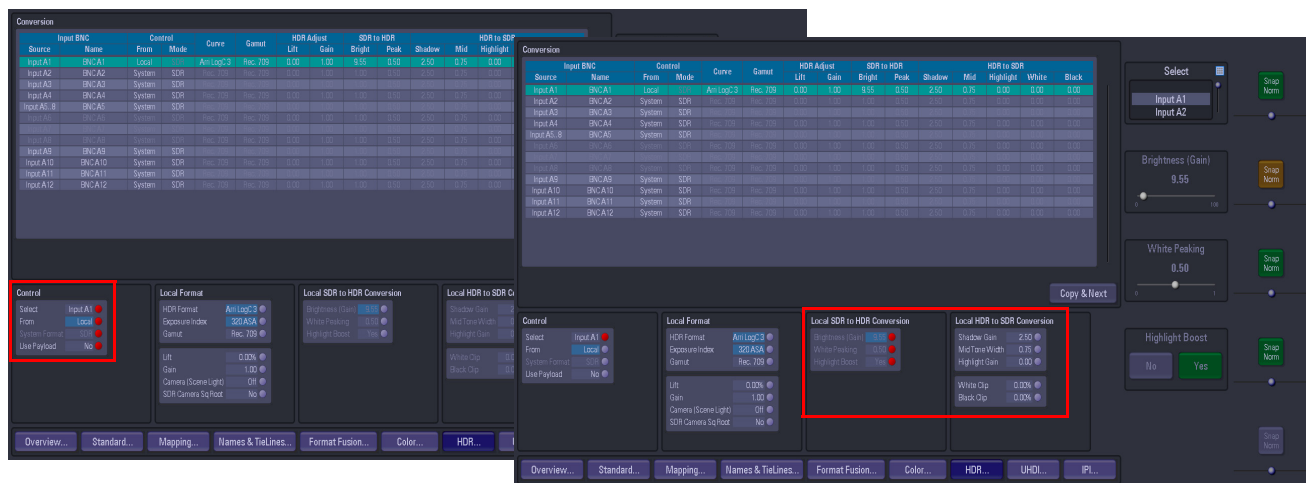
Using SDR or HDR when Keying Graphics

It is assumed that a lower 3rd store is being used as a Key over a background. In the Store Load menu, touch the menu link button at the top of the menu to display the popup and then touch the **{HDR}** button. The HDR menus below will be displayed.
If stores contain HDR or wide Color gamut material, Kahuna must be told the HDR format and Color gamut being used. Use "Delegate" parameter or Sub-Clip parameter to select the required store, then user the "HDR **Format"** and "Gamut" parameters to set the HDR format for the selected store.
If a still is SDR and the system standard is HDR, the store 'SDR to HDR' conversion controls will be active in the menu. If a still is HDR and the system standard is SDR the store 'HDR to SDR' conversion controls will be active in the menu.

For example - Working with BT 709 and Lower 3rd Graphics
Start adjustments with the 'Peak White' control at 0.0 then set the desired brightness with the 'Bright' control. Finally increase the 'Peak White' control to give a pleasing HDR result.

> Note: Lading a store will clear down the HDR/WCG settings to SDR/Rec. 709.
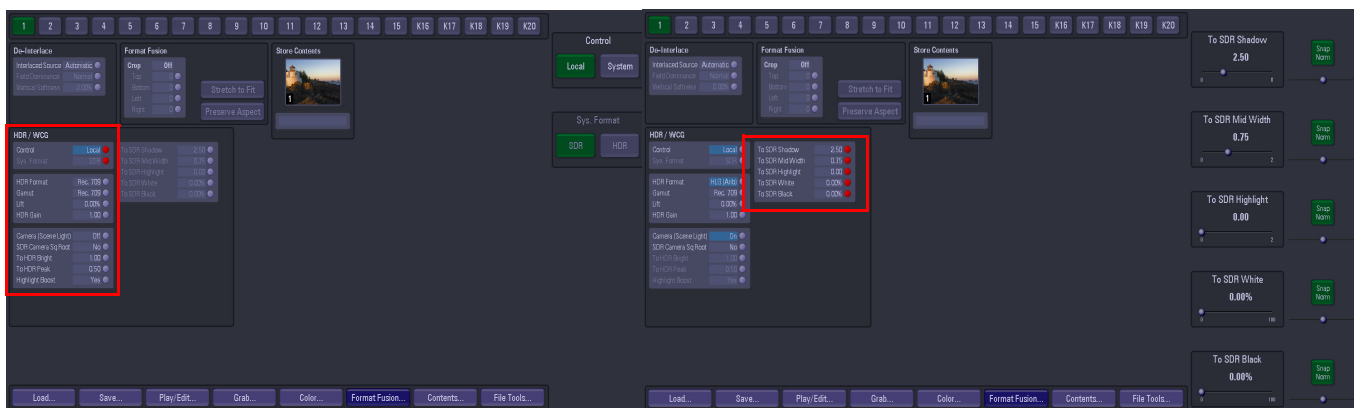
HDR Output Scenario - SDR to HDR or HDR to SDR Outputs?

In the **Engineering Config - Output Setup** menu, as with the Input menus, all outputs have to be setup individually, all outputs have to be set to the System Standard HDR format. Using the "**HDR Format"** and "Gamut" parameters, the outputs on Kahuna need to be told the HDR format and Color gamut required.

If the system format is HDR and an output is SDR the output 'HDR to SDR' conversion controls will be active allowing adjustment of the conversion process. If the system format is SDR and an output is HDR the output 'SDR to HDR' conversion controls will be active.

Use the parameter controls to setup the selected output to the required picture quality.

UHD Setup

UHD Overview

Working in UHD with Kahuna is as simple as working in any other video format, the setup menu structure is easy and intuitive and will allow the user setup UHD with just a few button presses. UHD demonstrates the power and flexibility of Kahuna, where SuperKeys can be resized and reposition anywhere on the UHD monitor, transitions are easy, a UHD Keyed source such as Clip transitions or UHD graphics can be keyed over the full UHD screen, and down conversion to a different video format is just a simple button press.

Connecting UHD Quadrants to the Inputs and Outputs

You have to setup the 4 quadrants in the Input and Output menus whether you are using Kahuna in 12G-SDI mode, Quadrant or 2SI mode.
The first step to understand when using UHD with Kahuna is how to correctly connect a UHD source to the inputs and outputs of the mainframe.

Inputs to the Switcher Mainframe

The mainframe inputs are in groups of 12 on each input Fin, up to 120 inputs in total, depending on the system setup purchased. The 4 quadrants of the UHD source have to be connected to consecutive BNCs so that the **System Input** menu can be setup correctly (this will be explained in the following sections).
The UHD quadrants have to be connected in the following order, for example; A1 (top left), A2 (top right), A3 (bottom left) and A4 (bottom right), then the next source A5, A6, A7 and A8 following the same quadrant order. So, the first quadrant of each UHD source is connected to A1, A5, A9 then move on to the next input Fin B1, B5, B9. The first quadrant **cannot** start at A2 or A6 etc...

Outputs from the Switcher Mainframe

There are 16 outputs on each output Fin up to 64 outputs in total, depending on the system setup purchased. Once again, the 4 quadrants of the UHD source have to connected to consecutive BNCs so that the **Output Setup** menu can be setup correctly. As with the input setup, the UHD quadrants have to be connected in the following order, for example; A1 (top left), A2 (top right), A3 (bottom left) and A4 (bottom right), then the next source A5, A6, A7 and A8. So, the first quadrant of each UHD source is connected to A1, A5, A9 and A13 then move on to the next output Fin B1, B5, B9 etc.The first quadrant **cannot** start at A2 or A6 etc...

MakeME^{TM} and UHD

The unrivaled flexibility of Kahuna's Make ME software allows the user to allocate resources to a UHD and non UHD logical switcher setup which as before, can either be a single broadcast studio setup or split across a number of studios, allowing one studio to broadcast in HD and another in UHD or a mixture of both.

In the "**Connect**" menu, touch the **{Mainframe Config}** button to enter the **Mainframe Configuration** menu, then touch the **{Switcher Config...}** button.
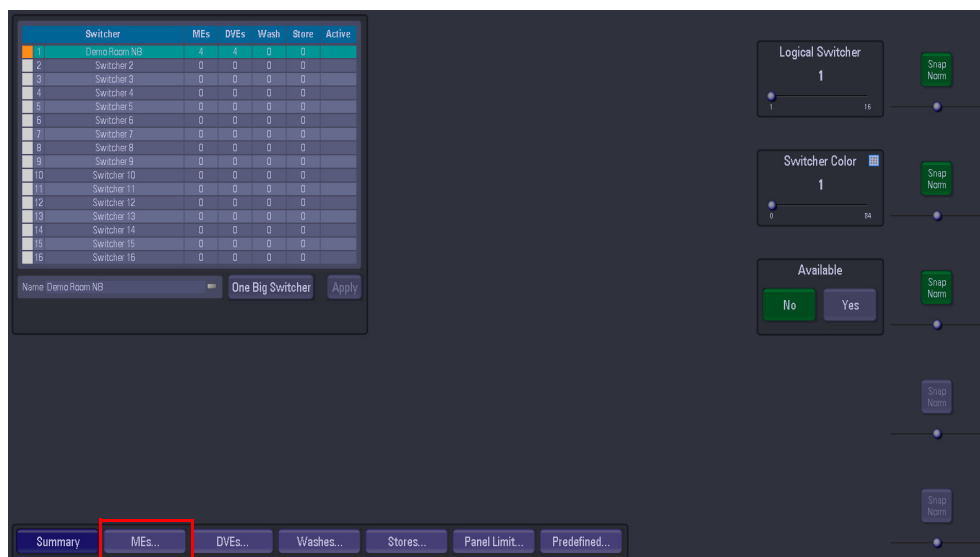
In the **Switcher Config** menu, touch the **{MEs...}** menu link button to enter the "**MEs**" menu. As with a non UHD setup, this is where the resources are allocated to each M/E, so in this menu the user will allocate resources to a UHD setup and allocate the UHD quadrants within the M/Es.

Touch the **{Make ME...}** menu link button, then in the "**MakeME**" menu use the "**Selector**" parameter to select the M/E/M/Es that will be use for UHD, then use the MakeME **Dual** or **Quad** buttons to quickly split the resources over the selected M/E (this can also be done by touching the "**Part2**"or "**Part4**" buttons and then use the **+/-** buttons to allocate resources individually).

It is important to decide how you split down the resources for a UHD configuration, as this will decide the type of UHD setup you will have available to you i.e. splitting the resources over 2 M/Es rather than 1 M/E will give you more resources such as the number of Keys, etc.

When using the "**Dual**" resource split, this would have to be done for the second M/E card in the mainframe as this would eventually make up the resources for the 4 quadrants over the 2 M/E cards.

Selecting the "**Quad**" resource split would eventually divide the resources for the 4 quadrants split over 1 M/E card.

Touch the "**Back**" or "**Up**" button to come out of the menu and a dialog box will give a prompt to save the setup that has just been created, once saved, the **MEs** menu will now be displayed.

> Note: When setting up M/Es for a UHD production, it is recommended that two M/Es are used and split into two to allow more resources to the UHD setup (as shown on the next page).

In the "**MEs**" menu, touch the **{UHD Config...}** menu link button to open the "**UHD Quadrant Linking**" menu.
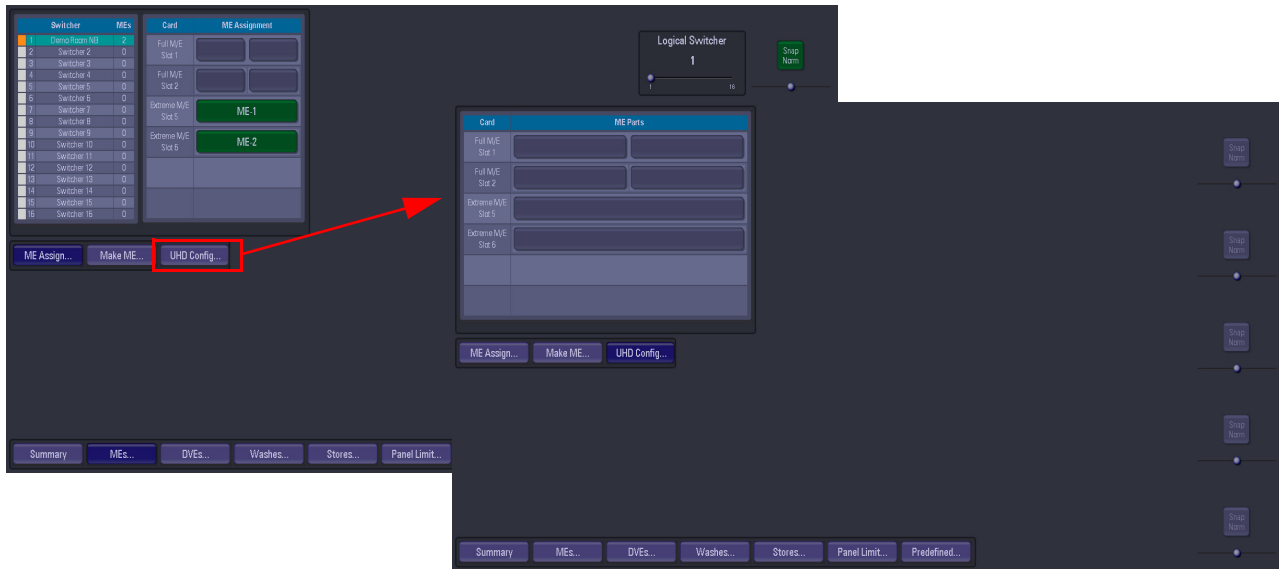
Touch the **top left quadrant** blank button and all four UHD quadrants are assigned (as shown below). Notice that the quadrants a labeled UHD(T/L), UHD(T/R), UHD(B/L) and UHD(B/R).

Touch the **{MakeME...}** menu link button to go back to the "**MEs**" menu to assign the M/Es to the cards.

This is done in the normal way by touching each of the blank buttons in turn, notice that each button now has "UHD" displayed on the button, the buttons have to be pressed once again to assign the M/Es.

Notice that the buttons have now turned green and each one says "**ME-3**" in the diagram below. Obviously this will be different depending on the user defined setup.

Note: If the M/E Assignment buttons are not **pressed twice** so that they turn green and display the allocated M/E, the **UHD setup will not work!**

Touch the "**Back**" or "**Up**" button to come out of the menu and a dialog box will give a prompt to save the setup that has just been created, once saved, the **Mainframe Configuration** menu will now be displayed, then touch the "**Up**" button once again to display the "Connect" menu. From here touch the "**Logical Switcher**" button for the required logical switcher, to login.

System Standard Setup

In the **Eng Config - System Standard** menu, the user is able to select between "**UHD Quadrant**" and "**UHD 2SI**" modes.

In 1080p 59.94 A or B standard, touching the "**System Standard**" attached will display the "**UHD Mode**" selection parameter.
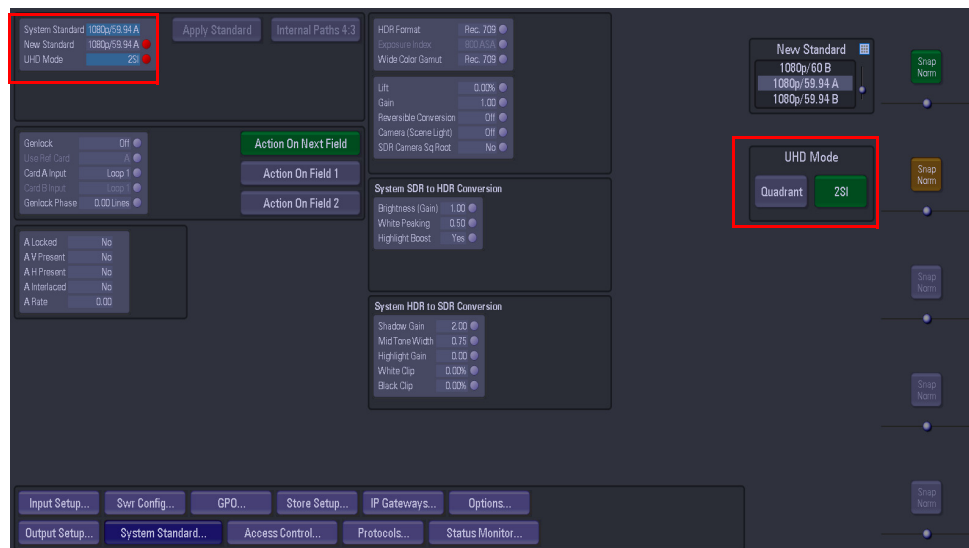
Here the user can select UHD Quadrant or 2SI when setting the system up to work in UHD.

UHD Input Setup

Once logged in, touch the **[ENG CONFIG]** button on the GUI to open the "Engineering Config" menu.

Touch the **{Input Setup...}** menu link button, then touch the {Standard...} menu link button.

It is worth noting at this point that if the System Video Standard is not set to 1080p... A or B then the **{Auto}** button should be pressed so that the switcher mainframe will auto detect the incoming video signal and adjust to suit the four UHD quadrant 1080p sources coming into the mainframe.
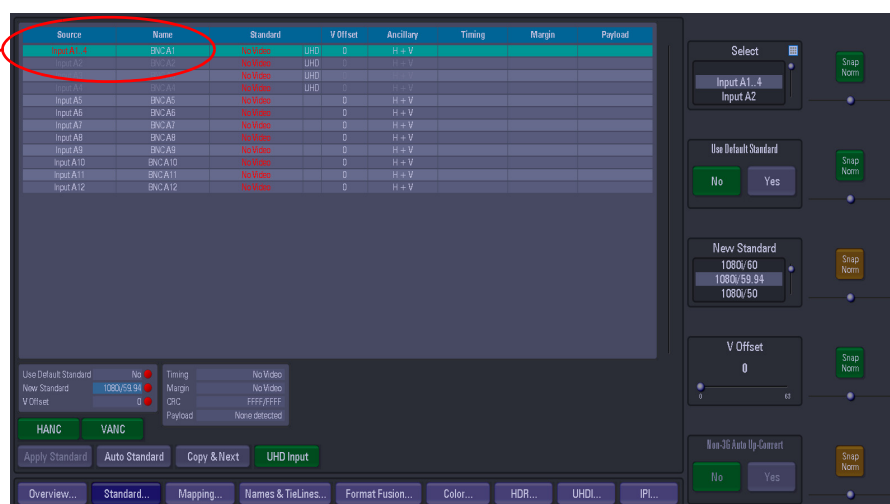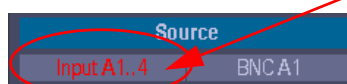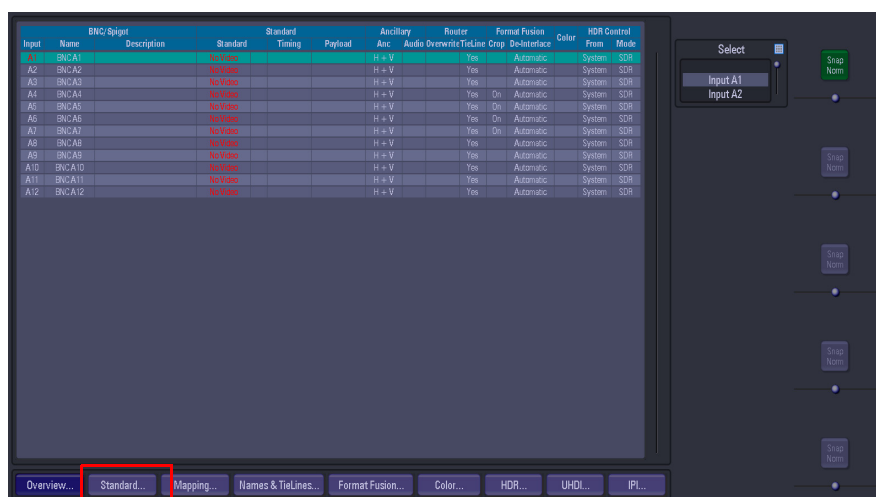
With the "**BNC Input**" parameter control set to the first UHD input connected to the mainframe (input A1 in this example), below the "Auto" button is a **{UHD}** button, touch the button and it will turn green, the UHD button will now tie all the UHD inputs together so that they all have the same settings. Use the BNC Input parameter to scroll through inputs A2-4 and they will be grayed out to help reinforce the fact that they are all part of the same UHD source. The system assumes that the UHD source is connected in the quadrant order of T/L - T/R - B/L - B/R and sets all other parameters accordingly in the background.

Apply the same setup for any other UHD sources, that is all that is required to setup the UHD inputs.

UHD Outputs

In the **Engineering Config** main menu, touch the **{Output Setup…}** menu link button to open the **Output Standard** menu.

Use the "BNC Output" parameter to select the first BNC of the UHD output, (BNC A1 in this example), then touch the "**UHD Quadrant**" **{On}** button. The system will automatically setup that output plus the next three outputs to be UHD outputs in quadrant order as was done with the inputs.
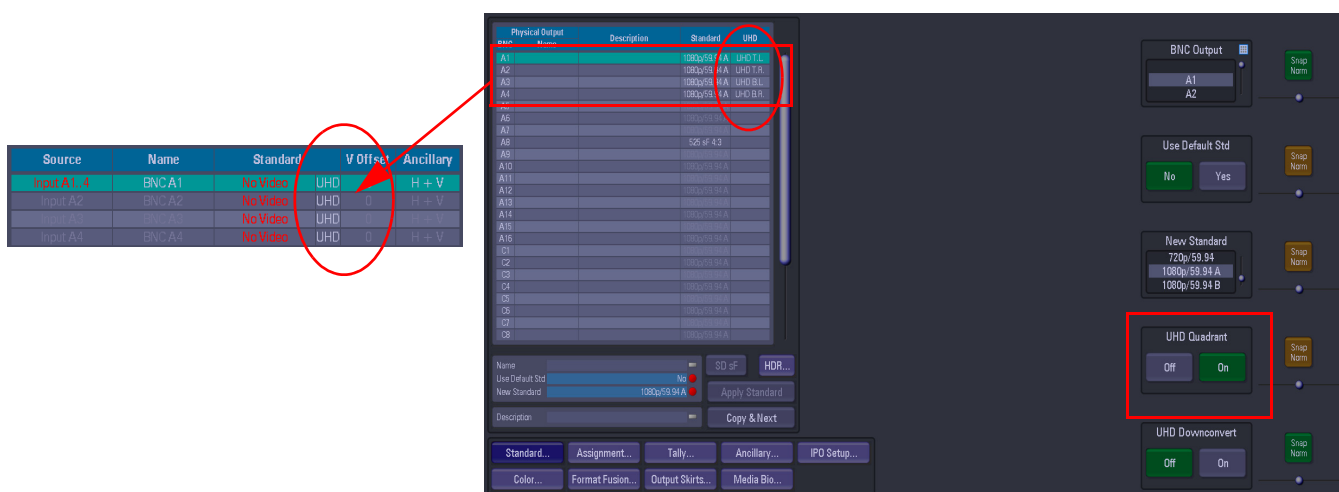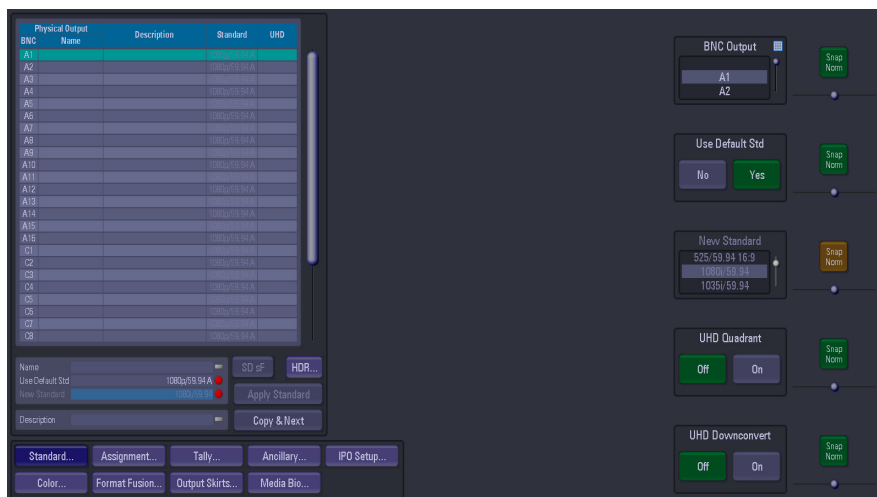
UHD Downconvert

Under the **UHD Quadrant** button is the "**UHD Downconvert**" button, this feature basically does what it says. When an output is selected and the UHD Downconvert button is turned "**On**", the system will automatically setup the selected output plus the next three outputs to be UHD down converted at the video standard that has been selected for all 4 outputs.
All four outputs must be the same standard.
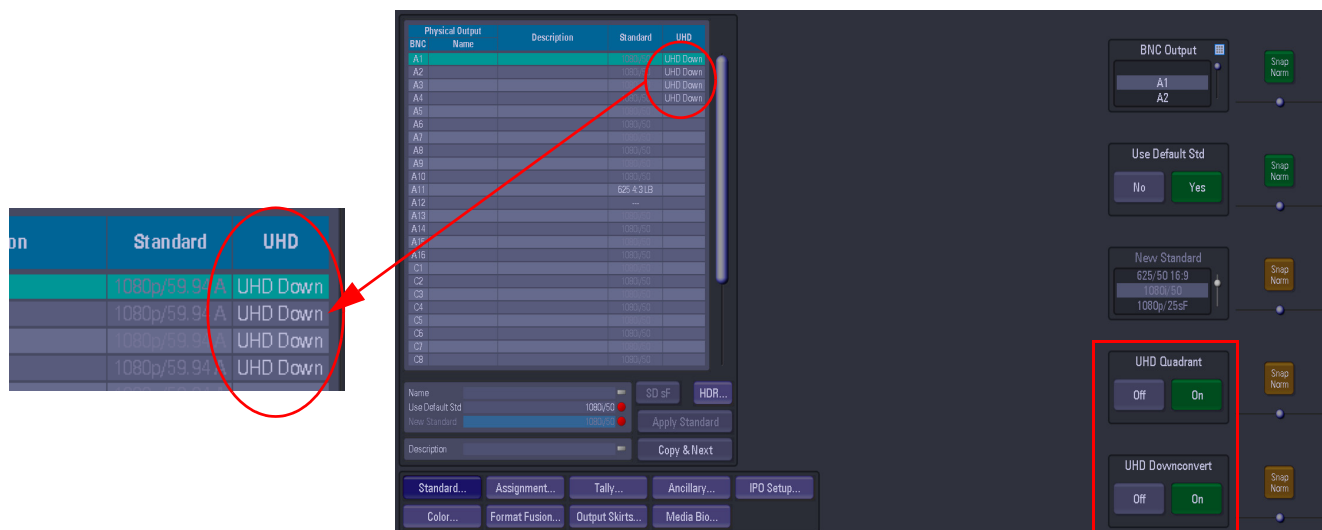
UHD Store Setup

Setting up UHD stills and clips in the internal clip store is done in a similar way to HD stores. Touch the **{STORE}** button on the GUI, then use the "**Store**" parameter the UHD still or clip is going to be loaded into, the 3 consecutive stores must also be empty.
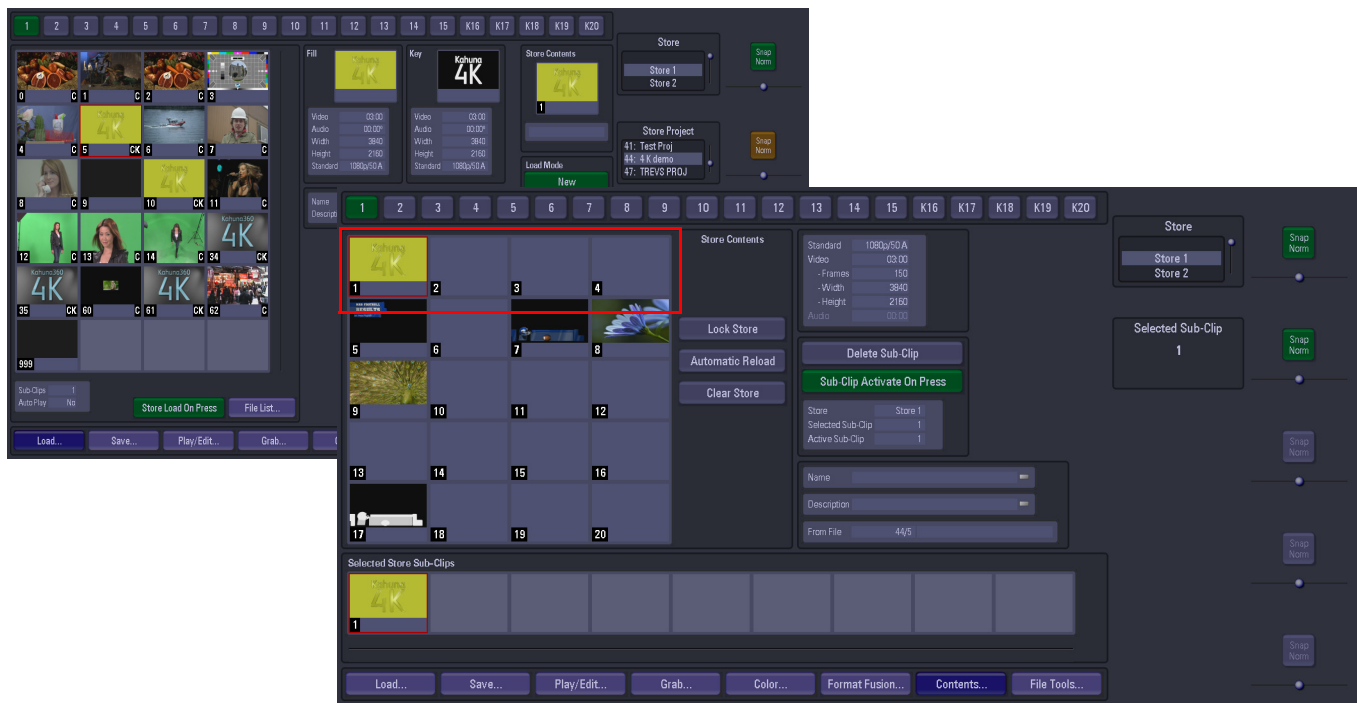
Select the Project contains the UHD still or clip, then use the "File" parameter to select the UHD still or clip. Touch the UHD minipic in the **Store Load** menu and the still or clip will load into the selected store.

Next, touch the **{USER CONFIG}** button on the GUI, and then touch the **{Store Setup...}** menu link button to open the **Store Coupling & Linking** menu.
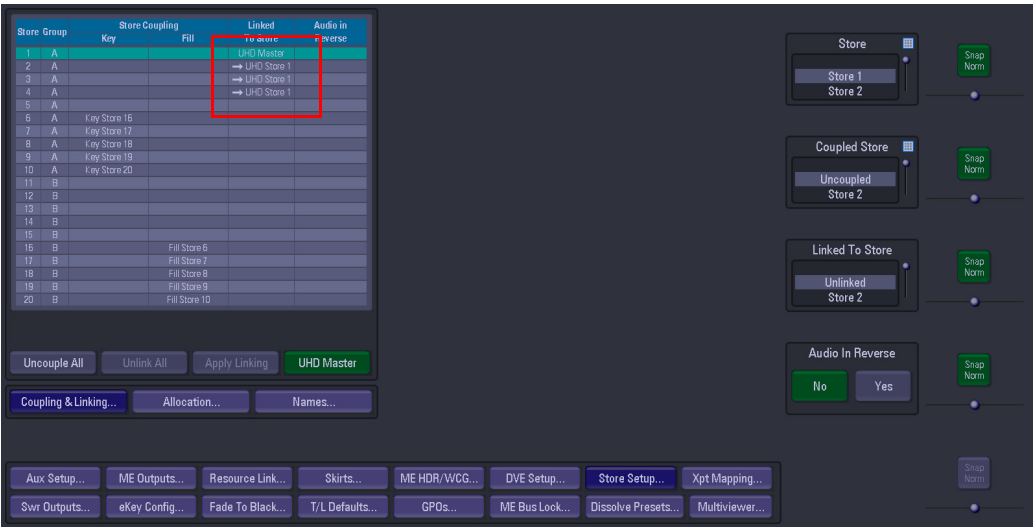
Scroll down to the store with the UHD still or clip and then touch the **{UHD Master}** button. It will automatically link the next 3 Stores to the Master Store.

If the file loaded is a UHD clip, when the clip is played, the Master Store will automatically play the three linked stores in sync with the Master Store.

UHD Stills and Clips that to be Keyed over a UHD source that contain Key and Fill elements, are setup in exactly the same way as a HD still and clip, just remember that they will occupy 4 stores for the Key portion and 4 stores for the Fill portion.

Up-converted SuperKeys that are being used with a UHD background can resize and reposition anywhere on the UHD monitor.

A UHD Keyable source can be keyed over the full UHD screen (such as clip transitions or UHD graphics) but if it needs to be repositioned or resized it must be downconverted first.

Mattes and Washes

Mattes & Washes Overview

Mattes & Washes can be used as a background, a Fill or a border, they can be set on any crosspoint the in the same way as a Source Input, Store or a Wipe border.

Mattes

Press the **[MATT WASH]** menu button on the GUI panel to enter the **User Config - Mattes** menu.
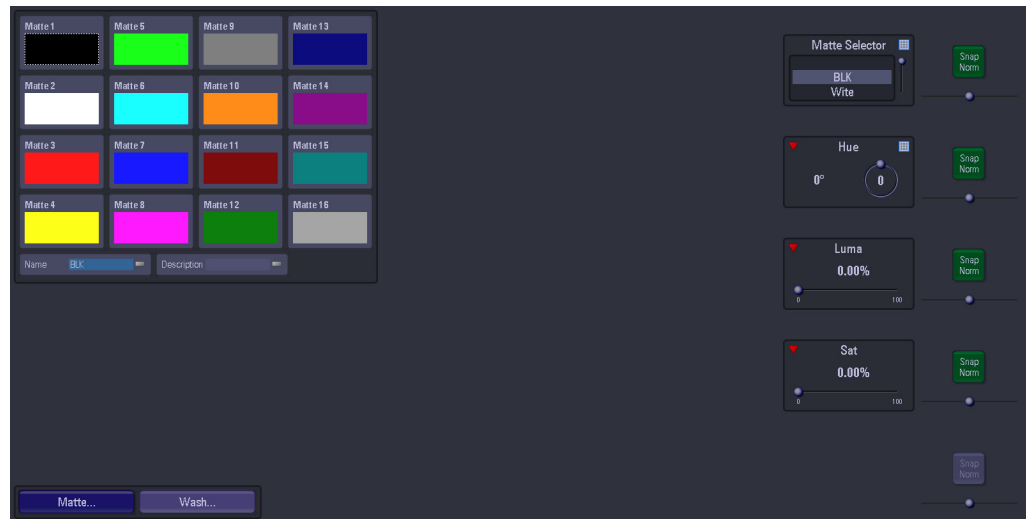
There are a total of 16 mattes that can be setup and used as a source.
Select the Matte color from the menu palette. To adjust the color, touch the selected matte on the menu screen and three parameters will appear.
Adjustment of Hue, Luma and Saturation is made using the parameter controls, or notice that there are Red triangles in the parameter boxes denoting that adjustment can be made using the tracker ball or the joystick.

When satisfied with the Matte color, a name can be applied to the Matte, using the USB or on-screen keyboards.

If a new name has been given to the matte, keep the number of characters in the name down to 8 (e.g. 4+4) and the Matte will be displayed in the mnemonic on the control panel, if added into the crosspoint as a source.

Wash Generator

Wash function will allow a matte to fade from one color to another color as a background or Fill. The Wash can be used in the same way as a Matte, as a Source Input, Store or a Wipe border. It is a mix of colors instead of a single solid color and will fade from one color into another in a specified direction.
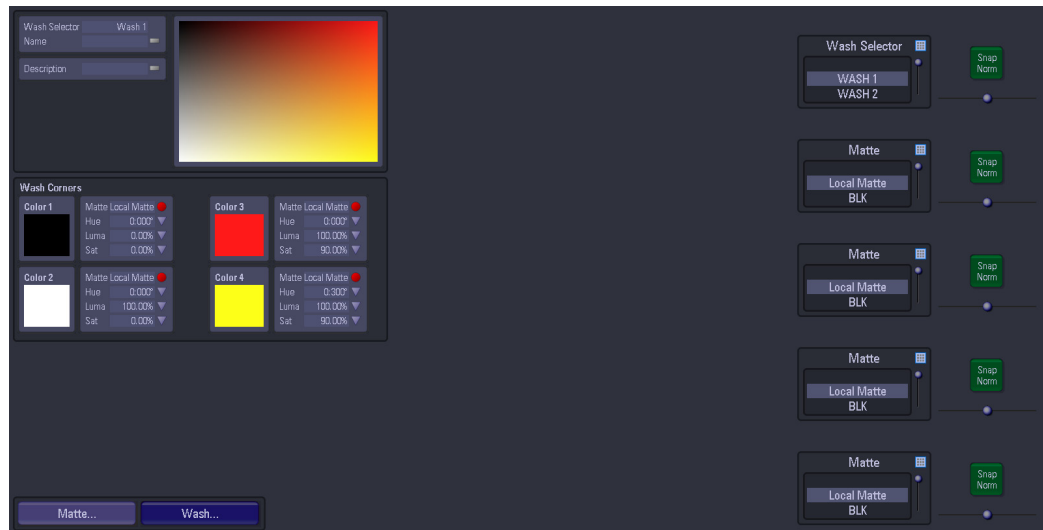
There are two Wash effects available (Wash 1 and Wash 2).

Press the **{Wash…}** menu link button to enter the **User Config - Wash Generator** menu. Use the Wash Selector to select a wash to adjust.

The above diagram (left) shows a possible Wash from a mix of colors. When a Wash is setup, the four corners can be set as different colors the resulting effect will be all the colors will wash into each other to give an overall mix of color.

The **Wash Corners** attachers (1 to 4) allow the user to change the color at each corner until the desired Wash is achieved.
The attachers can be set to one of the 16 available Matte colors, or use the Hue, Luma or Sat parameters to adjust to the desired color mix.

Stores Overview

Stores are one of the most important functions within a Kahuna system, they are used as internal sources and are globally available throughout the system for Crosspoints, SuperKeys, eKeys, Util buses and Auxes etc. Stores are comprised of **Still** images or **Clips** of video. The Stills, Clips and Audio (ClipTrax) can be either imported into the mainframe via the Filing System menu, or "grabbed" into the internal memory from any source connected to the 120 inputs to the Kahuna mainframe.

Stills, Clips and Audio are individual files that are saved into user defined Projects, up to 1000 stills and clip files can be saved into each project.

Stores are an option for the Kahuna mainframe and are usually purchased with an new system. The basic purchased option for stores is:

- 10 Store Outputs with 16 Gigabytes of memory; on 1 internal Control Card in the mainframe.

The maximum that can be purchased or upgraded to is:

- 20 Store Outputs with 64 GB of memory; split between 2 Control Cards.

This gives the user a maximum of approximately:

- 40 minutes of SD video storage
- 8 minutes of HD video storage
- 4 minutes of 1080p video storage
- Over 6 hours of Audio storage

> Note: When loading video clips into stores, Kahuna will automatically allocate the correct amount of time (memory) to the store to allow the clip to play once loaded, up to the maximum amount of memory in the mainframe. User defined store memory allocation can also be configured, see **User Config - Store Memory Allocation** section of the manual.
> The amount of video storage available will also be affected by the type of video standard set by the user.

Before still images, video clips or audio can be imported into the Kahuna mainframe, the files have to be processed through a software application called **Kahuna Manager**; which converts the original file format into the Kahuna native.sws format.

> Note: Kahuna Manager is a free software application that comes as an accessory with a new system, or contact Grass Valley customer support (see the contact details at the rear of this manual).

ClipTrax^{TM} - overview

A unique feature to Kahuna is that the Stores functionality is now capable of storing audio as well as video, the Audio Store function is known as "ClipTrax ". The audio and video data in an individual store are kept in separate areas of memory and can be manipulated independently of each other (described later in this section).

ClipTrax can be used in several scenarios:

- Pre-rendered flying key clips for transitions.
- Tied to DVE transitions
- Audio accompaniment on a general background

Audio can be output to any of the up to 64 outputs as "Embedded Audio" this is setup in the **Eng Config - Output Setup** menu. The audio information is output as AES 8 channel audio with video, which is output as SDI.

The ancillary audio can also be passed via the Store functionality, which is the ClipTrax option, the embedded ClipTrax audio can then be passed to the mainframe outputs.

The audio or audio and video can be grabbed from an imported Clip, and then placed in one of the available Stores. Here the audio and video can be manipulated separately to build a clip or the audio can be combined with video in another Store to build a clip.

Audio can be imported using the Filing System Import/Export option, from a memory device, and placing the imported audio into a Project.

If imported using a memory device, the file format must be a.WAV file with the following rules applied: 48kHz, 24 bit, that can contain up to 8 channels of audio.

The files can be can loaded or saved maintaining the Audio or Video in a Clip.

Ancillary Data software option must be loaded before audio can be output from the Kahuna mainframe. ClipTrax software option must be loaded before the audio store facility can be used.

Importing Stills and Clips

It is important to understand how to get Stills and Clips into the Kahuna mainframe before using the stores menus. As mentioned earlier, Stills and Clips can be imported into the mainframe via the **Filing Sys** menu; through one of the USB ports on the GUI/mainframe, or the eSATA port on the mainframe.
To do this, connect the hard disk drive or memory device to the mainframe and then press the **[FILING SYS]** button on the GUI.
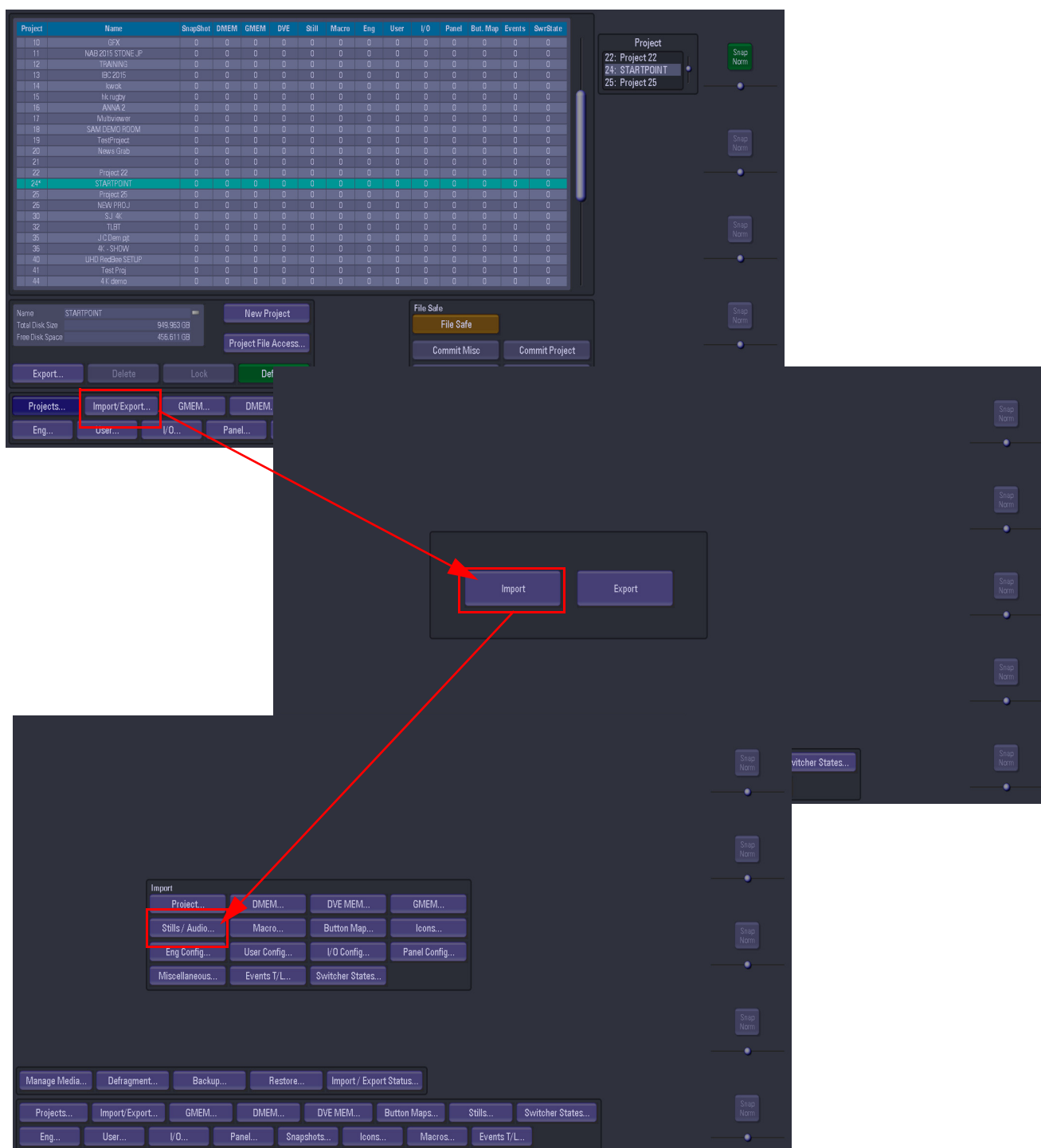
Press the **{Import/Export...}** button and then in the Import button area, press the **{Stills...}** button.
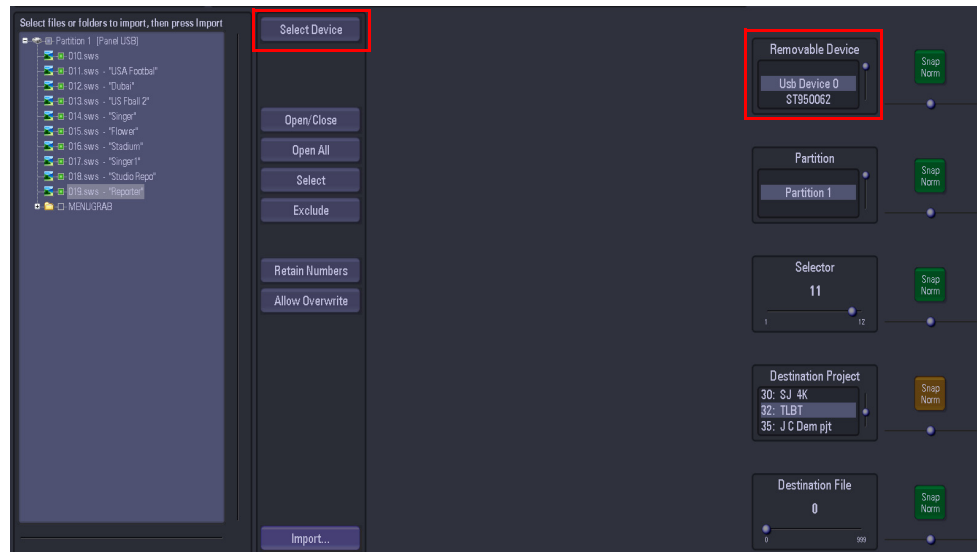
Use the **Removable Device** parameter to select the memory device containing the stills or clips and touch the **{Select Device}** button. The contents of the memory device will be displayed in the gray area, left hand side of the menu. Use the **Destination Project** and **Destination File** parameters to select where the files will be imported to.

Using the **Selector** parameter and **{Open/Close}** button, navigate to the files that are going to be imported. Again use the **Selector** parameter and the **{Select}** button to select the required files and then press **{Import...}**.

The files will now be imported to the selected project destination ready to use.

Going back into the filing system main menu, the imported files can be found in the **{Stills...}** menu as shown below.

In this menu an new name and description can be given to a selected file using the on-screen keyboard.
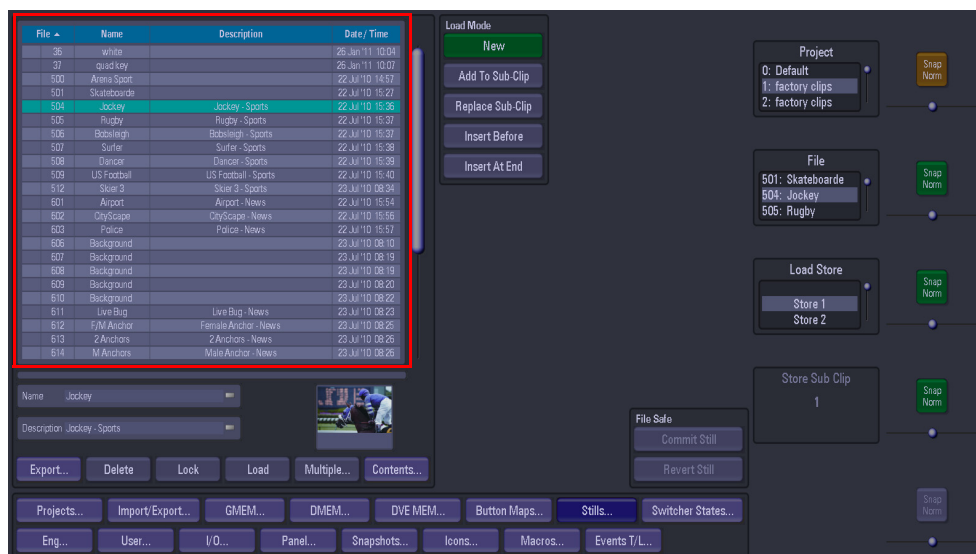
Store Load Menu

To get to the Store menus touch the **{STORE}** button on the GUI.

The first menu that will appear is the **Store - Load** menu, this is where the user is able to load stills and clips into the individual stores.

To find stills and clips files that have been uploaded to the Kahuna mainframe, scroll through the **Current Projects** parameter to find the required project. The stills and clips will be displayed as minipics as shown in the menu below.

> Note: Notice that there is a number in the bottom left corner of the minipic, this is the .sws number given to the still or clip when converting it in the Kahuna Manager software.
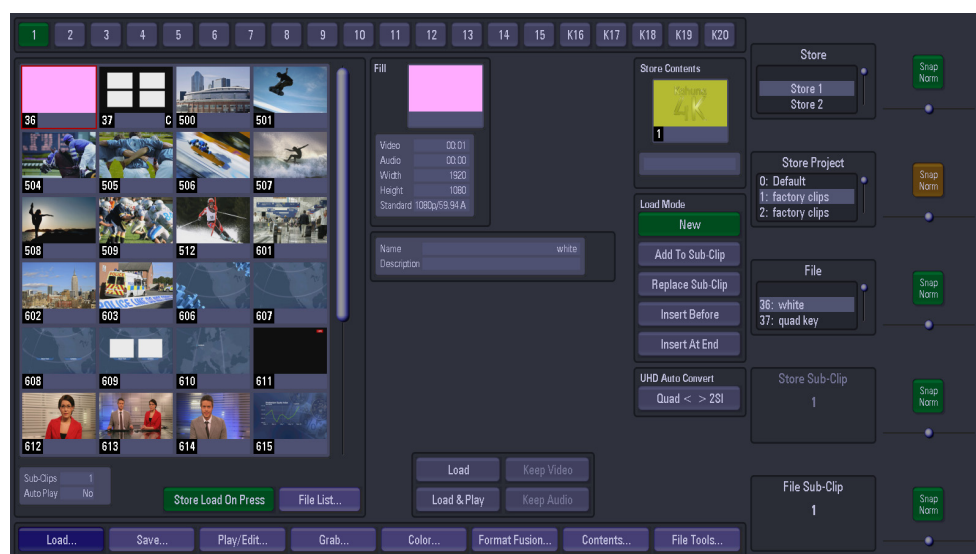
Next we will look at how to load stills and clips into stores.

In the **Store Load** main menu, the "MiniPics" (as shown below) show an image of the stills and clips is stored with in a Project. The Stills, Clips and Audio Clips are sequenced in numerical order. This number appears on the bottom left of the mini pic starting with 0 and ending at 999 depending on the number given to the still or clip in the Kahuna Manager software.

The mini pic is generated from a still or the center frame of a Clip. The bottom right hand corner will display "C" if the image is a Clip.

A "K" in the bottom right corner indicates that the Still or Clip has a Key saved with it. This Key will be loaded into the Coupled Store (see store Coupling in the previous section). A "CK" identifies the clip as having a Key associated, and would be used when keying over a background. A speaker in the top right corner signifies that the store contains audio content.
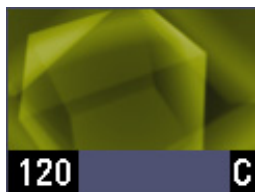
Loading a Still or Clip into a Store

Use the **Store** parameter or touch one of the "Store" select buttons to select the Store that the Still or Clip will load into. Then using the **File** parameter to scroll through the mini-pics, notice that there is a Red box around the mini-pic while scrolling. You can also just touch the minipic to select it. Once the mini-pic has been selected, or press the **{Load}** button to load the image into the selected store.
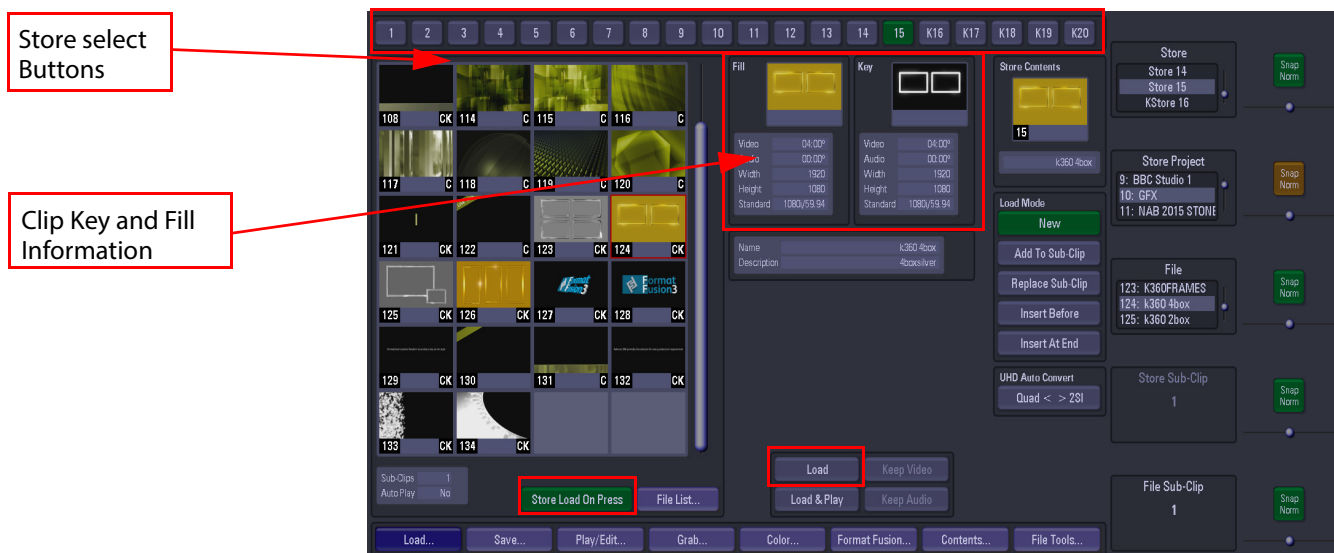
If you touch the **{Store Load on Press}** button (will turn green), the selected still or clip will automatically load into the selected store when the mini-pic is touched. With **Store Load on Press** disabled (gray), when you touch a mini-pic, the still or clip Fill and Key information about; video length in time, audio length in time, aspect and video standard is displayed to the right of the list grid of stills and clips (as shown below).

The loaded still or clip is also displayed top right next to the Fill and Key info. If there are numbers displayed in the bottom right of the mini-pic (1/13) as displayed above, this means that the Store contains "Sub-Clips"

When loading a clip into a store, a progress bar dialog box will appear on the screen, the loading process may take a few seconds depending on the size of the clip, especially if the clip is in a 1080p or UHD video format and a few seconds long.

> Note: When loading stills or clips into a store, look at the gray box top left of the Store Load menu, during the loading process "Loading..." will appear. When the loading process is finished "Done" will appear.

The touch-screen can also be used to scroll through the minipics using the scroll ball to the right of the mini pics area of the menu.

If the selected store is also selected on a crosspoint that is currently output to a monitor. When selecting a clip use the **File** parameter to scroll to the required clip and touch the **{Load and Play}** and the clip will load into the store and play for the duration of the clip.

If the original Fill store is an audio only file, and the user wants to keep the audio content as part of a new Still or Clip, by pressing the **{Keep Audio}** button the audio content will remain as part of the new Fill store. This could be used for example in a Clip Transition.

This option is the same when an audio file is loaded and the "Keep **Video"** function is used.

> Note: This function will only work when the **Load Mode** parameter is set to **Replace Sub-Clip** (as described below) the Keep Video and Keep Audio buttons will be grayed out if Load Mode is on any other setting.

Stills and Clips can also be loaded directly from the number pad or via GMEM's (see the GMEM section of this manual)

Load Mode Parameter

New - Allows the user to load new stills and clips into a store.

> Note: Any stills or clips in the selected store will be over written.

Add To Sub-Clip - This will send a still or clip to the Sub-Clip folder of a selected store, each time a still or clip is selected by touching the miniclip or pressing **{Load}** the still or clip will be sent to selected store as a sub-clip. In the Append To Sub-Clip mode, if a different still or clip is loaded into sub-clips, the original still/clip will be over written.

Replace Sub-Clip - This will replace a still/clip in the selected Store Sub-Clip.

Insert Before - If a number of stills/clips have been loaded into the **Sub-Clip** folder, using the **Store Sub-Clip** parameter to move to a defined point within the sub-clip line-up, a still/clip can be instead before the selected still/clip in the sub-clip line-up.

Insert At End - Allows the user to insert a still/clip at the end of the Sub-Clip lineup, to the point at where the sub-clip folder is full.

Setting Up ClipTrax

Before using the ClipTrax function, the user has to setup a few menus to allow audio to pass through the system.

> Note: Make sure that the ClipTrax Option is loaded into the mainframe in the Eng Config - Options menu before proceeding.

> Note: To show how ClipTrax could be used, this example describes ClipTrax being used in a Clip Transition.

The first menu to setup is the **Eng Config - Output Setup** menu. Touch the **{Ancillary...}** menu link button.
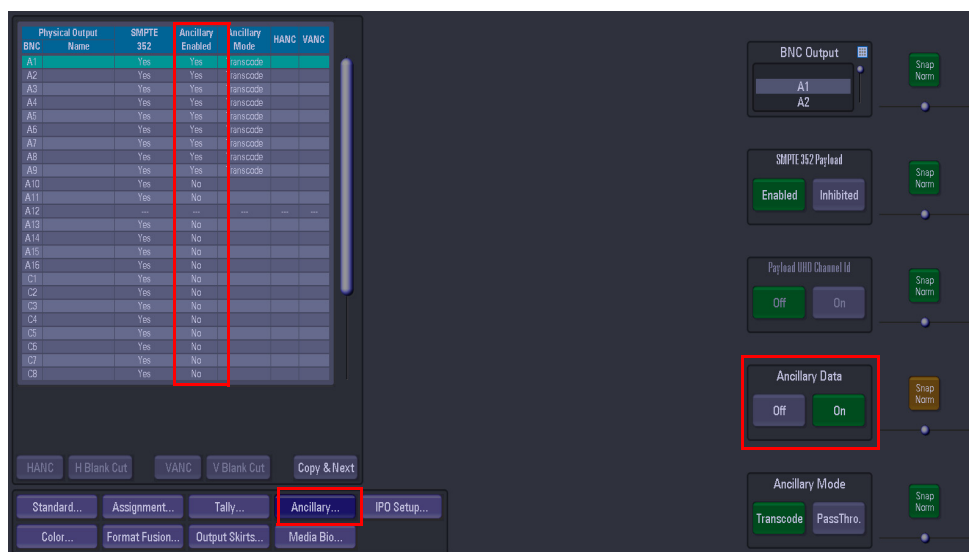
The system needs to know which BNC the audio is going to output through, use the **BNC Output** parameter to select the required BNC, then use the **Ancil Audio** "**Yes**" parameter to turn on ancillary audio on the selected BNC. Notice that **Yes** has been added to the **Ancil Audio** column in the Table.

The next menu to setup is the **User Config - ME Output Config** menu.
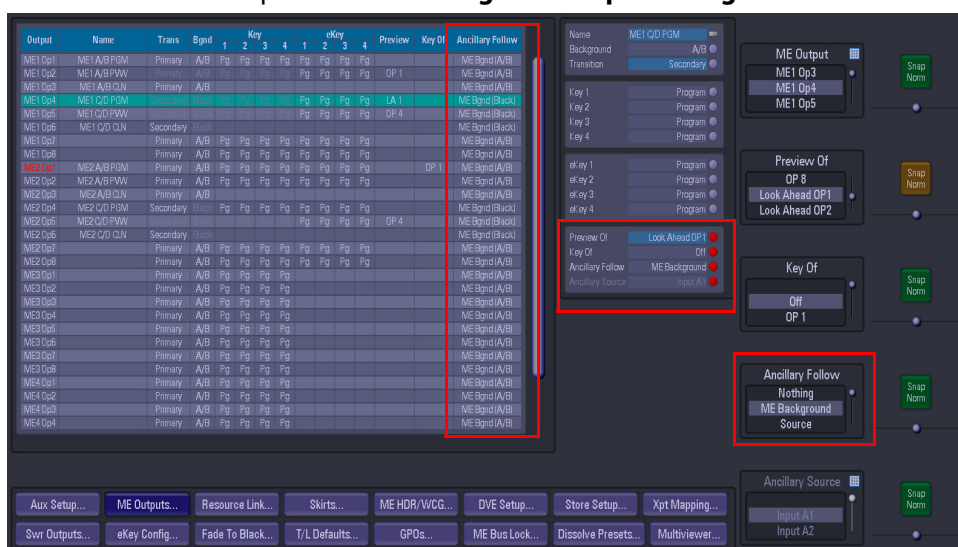
In this menu set the "Ancillary Follow" parameter to ME Background, Source, Bgnd A/B, Bgnd C/D etc. so that the audio will follow the selected function.

Note: If "Source" is selected in the **Ancillary Follow** parameter, then the source can be selected using the **Audio Source** parameter

In the **Store - Load** menu, load the clip (bug) into a store, as shown below left, (a Keyed clip is loaded into Stores 8/9), next go to the project where the audio clip file is stored, then make sure that the **Load Mode** parameter is set to "**Replace Sub-Clip**" and the **{Keep Video}** option is selected, load the required audio clip into the same store as the video clip.

Note: If importing an audio clip into a project in Kahuna, the audio file has to be a.WAV file with the following rules applied: 48kHz, 24 bit, that can contain up to 8 channels of audio.
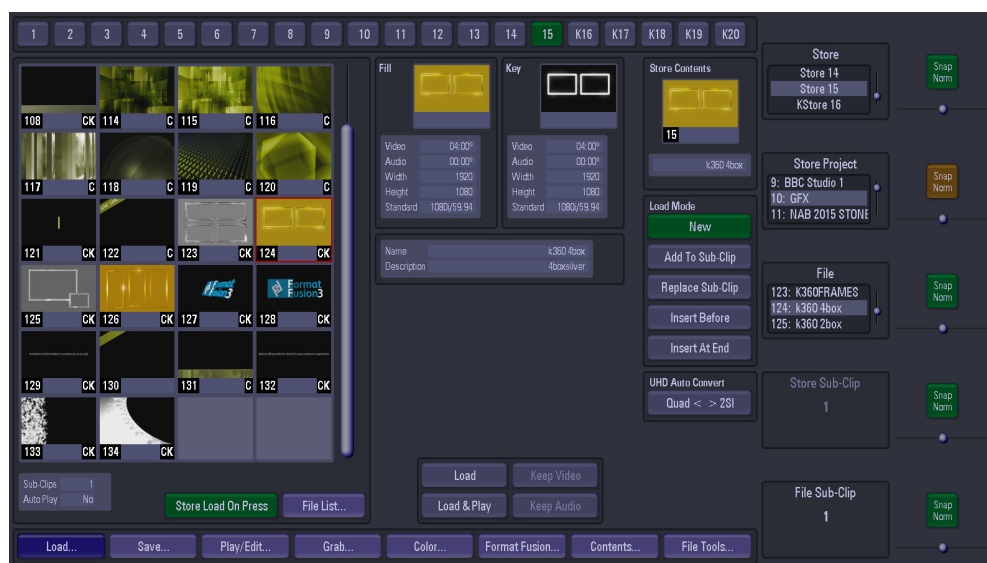
In the Contents menu shown below, the Keyed Clip can be seen in Store 1 along with a speaker (top right) indicating that the file contains audio.
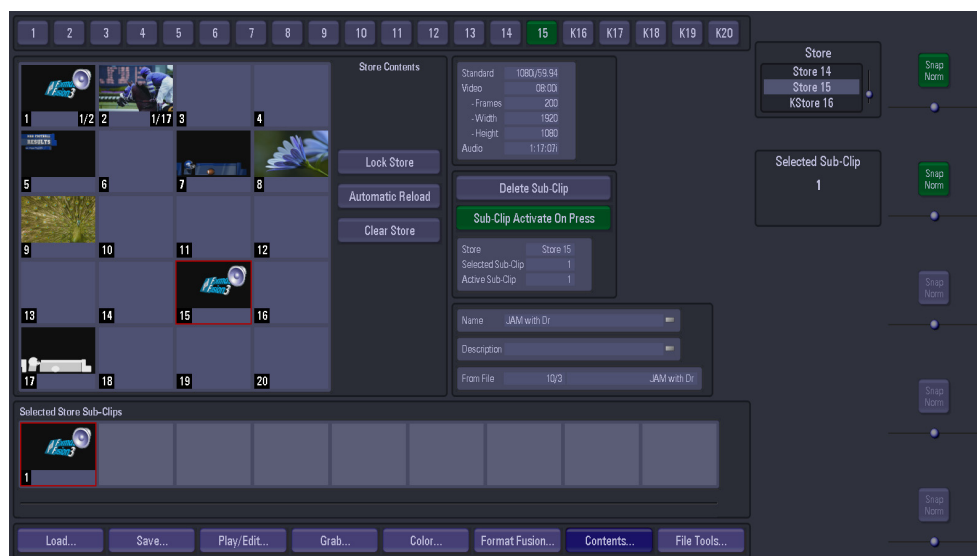
If the audio file is too long needs to be adjusted in some way, the audio file can be adjusted in the **Store - Play/Edit** menu.

Make sure that the correct store is selected (a minipic of the store can be seen at the bottom of the menu), press the **{Edit Mode}** button, and then press the **{Edit Audio}** button. Use the **Position** parameter to move along the audio file and then press the **{Mark In Point}** and **{Mark Out Point}** buttons to set the required length of the audio files.

> Note: If the audio needs to start later than the video, the Audio Delay parameter can be adjusted.
> When set to 0% (default) the audio and video will start at the same time, +100% the audio will start after the video finishes. -100% the video starts after the audio has finished.

The store is now ready to be used in a Clip Transition.

Creating a Clip transition:

- Make sure that the store has been assigned to a crosspoint.
- Select a Key (e.g. Key 1) in the Key delegation area of the control panel and then use the Key crosspoint buttons to select the Store as a source.
- Select the two crosspoints that the clip transition will transition between (Bgnd A/B).
- Select Key 1 in the Key Control area of the control surface and then press the **[Clip]** button.
- Move the T-bar to transition between the selected backgrounds and as the T-bar moves, the selected clip (Store) will transition with the backgrounds as a Clip Transition as the diagram shows below.
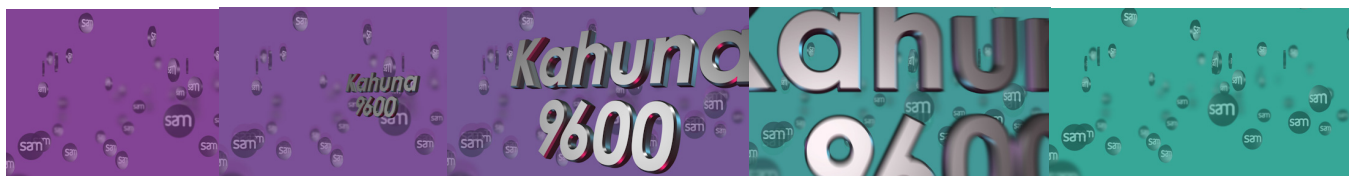
Store - Load (Details)

In the **Store - Load** menu, press the **{Details…}** button, this menu will show further information about a selected still or clip.

The table displays the information given to the still or clip when saved or loaded into the Kahuna mainframe, these details include; the Name, Description and Date/Time that the still or clip was saved.

Selected Still/Clip

Still/Clip Details for Fill and Key
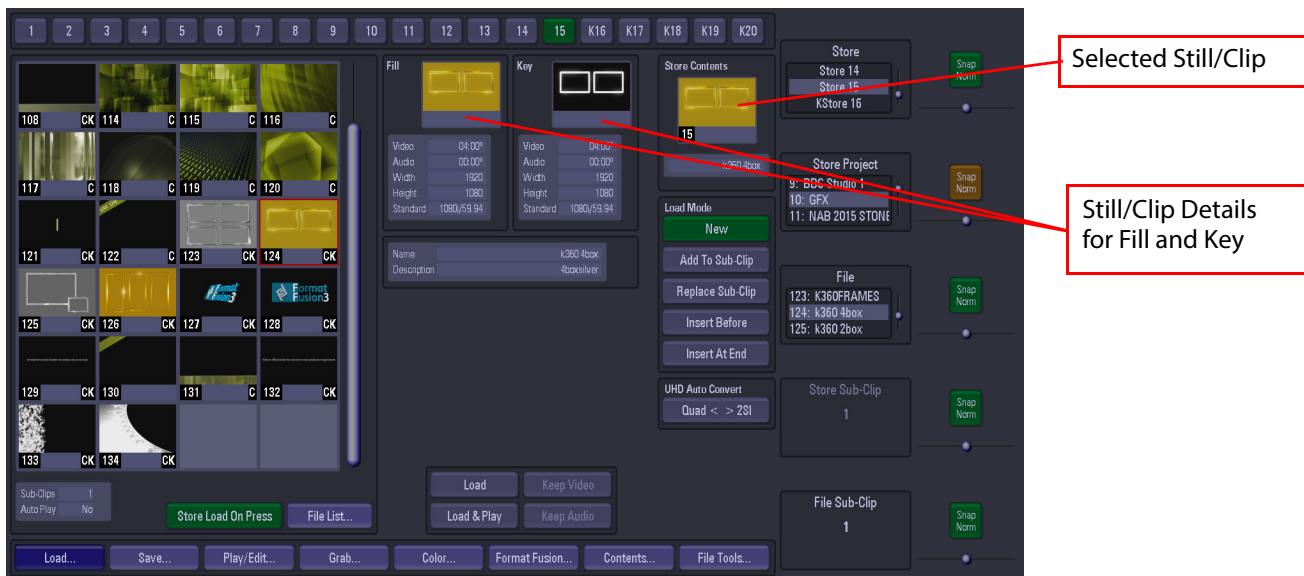
Fill and Key Details

The Selected Still/Clip will show a minipic of the Fill and Key (if coupled). The details box will display information regarding the video standard, the width and height and if the file is a clip, the duration of the clip in time and frames.

A new file (Still/Clip) can be selected and loaded into the Fill/Key window, by scrolling through the file table or using the File parameter to select the file. Once a file has been selected, as with the **Store - Load** menu, the user is able to load the still/clip into a store by pressing the **{Load}** or **{Load and Play}** button. Alternatively, if you touch the **{Store Load on Press}** button (will turn green), the selected still or clip will automatically load into the selected store when the mini-pic it touched.

> Note: If a Load or Load and Play buttons are pressed in this menu, the original file in the selected store will be over written.

Store - Play/Edit

This menu allows the user to play or edit a selected clip.

Transport Controls

1. Play/Rev - plays a clip forwards and in reverse at standard speed

2. Stop - stops a clip

3. Frame Step - steps a clip forward and backward by one frame

4. Steps to Start or End - steps to the end or the start of the clip

Loop - will make the file loop from start to finish indefinitely.

Ping- Pong - will make the file run from start to finish then finish back to the start again constantly.

Clip Advance - will move the clip forward by 1 field

Parameter Controls

Number of Sub-Clips - this displays the number of sub-clips within the selected store.

Linked Store - this will display any store that is linked to the selected store. Linked Stores are used for example when two large size (1080p) video clips need to be played out, when loading the clip into one store it will automatically be loaded into the linked store so that loading time is canceled.

Loop Count - this parameter selects how many times a clip is played back in a loop. When set to "0" the clip will pay until stopped, the parameter can then be adjusted from 1 to 100 loop counts.

Audio Delay - if the audio needs to start later than the video, the Audio Delay parameter can be adjusted.
When set to 0% (default) the audio and video will start at the same time, +100% the audio will start after the video finishes. -100% the video starts after the audio has finished.

Trans Duration- this parameter displays the current Transition Duration time, the user is able to use this information when setting up an audio/video clip to be used in a clip transition.

Playback Mode

The user has the option to play back Clips in **Field** or **Frame** mode, or Field 1Only or Field 2 Only using the **Playback Mode** parameter control.

This feature can be used if a Clip is made from a sequence of individual Stills. If each Still is a Frame in duration the user can Play/Position the Still and in the Stop state, both fields (Full resolution) will be displayed. If the material is Field based then in Frame mode the user will risk seeing flickering images from two different fields.

Edit Controls

Press the **{Edit Mode}** button, then the user can setup "in" and "out" points on the Audio/Video Clip. Position the start point of the Clip as required using the Position control on the right hand side and **{Mark In Point}**. This will now show the frame number in the In Point box.
Next, position the Clip at the end point of the Clip required and **{Mark Out point}**. This will now show a frame number in the Out Point box.
Come out of Edit mode by pressing the **{Edit Mode}** button. When the {Play} button is pressed, the Clip will only Play, Loop or Ping-Pong, from the set In Point and set Out Point. This new Clip can now be saved.
Key Follows Fill - If editing a clip that has an associated Key signal, Key Follows Fill is will also mark the selected In and Out Points for the Key signal in the coupled Key Store.
Apply Edit - will apply the changes to the selected clip.

Store - Pan/Crop

This feature allows the user to manipulate the stills/clips that are assigned to one of the stores. There are two types of Pan/Crop available to use:

- Sub-Clip based.
- Framestore Based

In Framestore based Pan/Crop, the adjustment will pan or crop all stills/clips in the selected store and all sub-clips if the store is set to contain sub-clips.
In Sub-Clip based Pan/Crop, if the user selects an individual sub-clip in the sub-clip list, then using the Sub-Clip pan/crop parameters then only the selected sub-clip will have adjustments made to it.

Both have exactly the same adjustments, it is useful to have set the store up on a crosspoint so the store can be displayed on a monitor to assist in cropping or panning.

Make sure that the **Crop/Pan** function is turned ON, by touching the **{OFF/ON}** buttons in the Crop parameters.

Crop - adjustment range 0 to 100%, where 0% is full and 100% entirely cropped away.
Use the Horizontal and Vertical Pan parameters to move the still to the correct position. This function effectively moves the still around under the set cropped borders.

Store - Grab

Another option to generate a Still or Clip is the **Store - Grab** option; this allows the user to grab images, video or audio clips from a Crosspoint, DVE Output, M/E Output, Matte/Wash or from another Store.
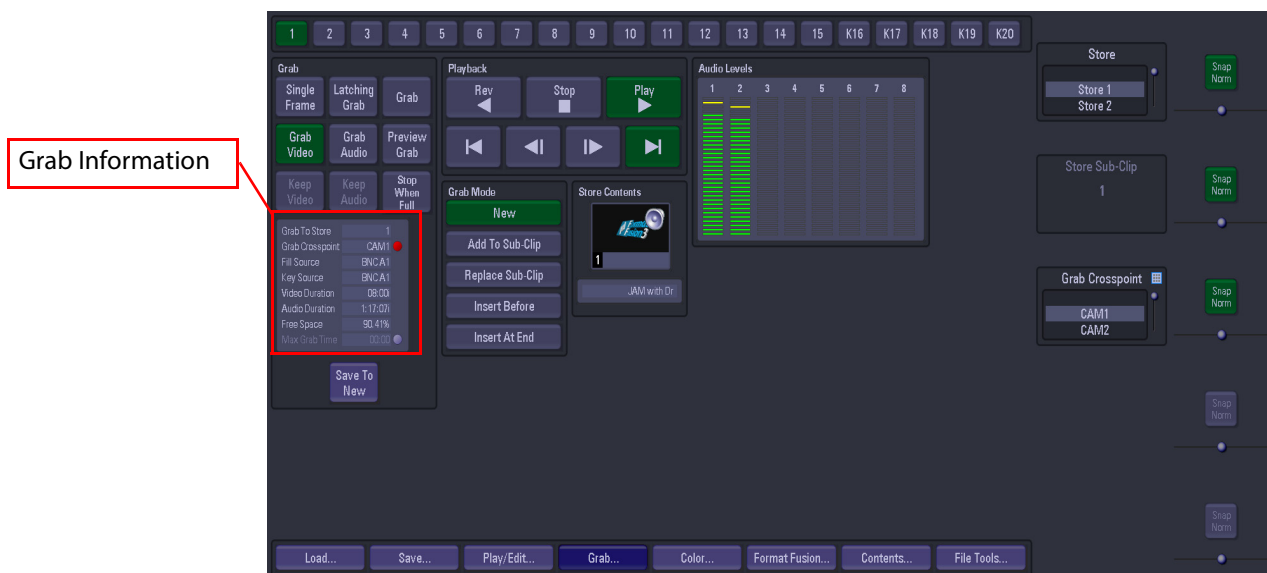
Taking a Grab

This example is taking a grab using the most simple method. Using the **Grab Crosspoint** parameter (or pop-up selector), select the required still or video source that contains the images or video content, then using the **Store** parameter, select the Store into which the grabbed information will be placed and press the **{Grab}** button.

If the information that is grabbed is coupled with another store for a Key, the Grab function will grab the Key as defined in the crosspoint mapping into the coupled store.

The minipic at the bottom of the menu will display what is currently grabbed, if it is a still, or the center frame of what is in the store if it is a clip.

Grab Options

Single Frame - used to grab a single frame into the store on press.

Latching Grab - this will latch the grab function and allow the grabbing of Clips. This option is best used with the Stop When Full to end the grabbing once the Store is full i.e. once all the available frames in the Store have been used.

Latching Grab is best used for grabbing Video or Audio files. Pressing the **{Grab Video}** button, which turns the button green, then pressing latching grab for the required grab time will grab video only. Pressing the **{Grab Audio}** button, which turns the button green, then pressing latching grab for the required grab time will grab will Audio only. With the both buttons green, Video and Audio will be grabbed.

Note: This is part of the ClipTrax function, **Grab Mode** has to be set to "**Replace Sub-Clip**" for this function to work.

Grab - This will continue to grab while the button is pressed. This will also respect the Stop When Full.

Preview Grab - This will place a preview of the grabbed image or video into the minipic at the bottom of the screen.

Grab Mode Parameter

New - Allows the user to grab new stills and clips into a store.

> Note: Any stills or clips in the selected store will be over written.

Add To Sub-Clip - This will send a grabbed still or clip to the Sub-Clip folder of a selected store, each time a still or clip is selected by touching the miniclip or pressing **{Load}** the still or clip will be sent to selected store as a sub-clip. In the Append To Sub-Clip mode, if a different still or clip is loaded into sub-clips, the original still/clip will be over written.

Replace Sub-Clip - This will replace a still/clip grab in the selected Store Sub-Clip.

Insert Before - If a number of stills/clips have been grabbed into the **Sub-Clip** folder, using the **Store Sub-Clip** parameter to move to a defined point within the sub-clip line-up, a still/clip can be inserted before the selected still/clip in the sub-clip line-up.

Insert At End - Allows the user to insert a grabbed still/clip at the end of the Sub-Clip lineup, to the point at where the sub-clip folder is full.

The attacher below the Grab buttons displays:

Grab Store - the Store the video/audio grab will be saved in.

Grab Crosspoint - displays the source the Video/Audio is taken from.

Fill Source/Key Source - this displays the Key and Fill sources that make up the Still or Clip

Video Duration - length of the video clip

Free Space - the amount of memory left in the system

Store - Save

As the menu suggests this is where stills and clips are saved into Files and Projects.
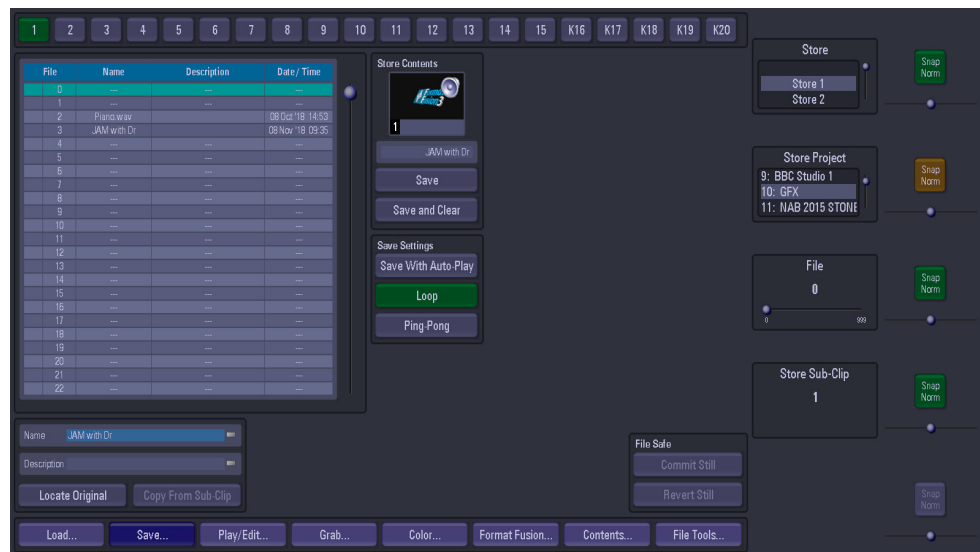
This menu will show a mini pic of the Store that is about to be saved in the "Store Contents" gray box above the **{Save}** button.

Use the **Current Project** parameter control to select the project. Select the File number using the control **File** parameter on the right hand side or scroll down the table to where the still or clip will be saved.
Determine if you require the file to be saved with **Save With Auto Play** - On or Off. This will make a clip automatically play when loaded.
A name and description can be given to the file. Once the selections have been made, press the Gray Save button to save the file.

Using the "**Store Sub-Clip"** parameter, the user is able to select stills and clips within selected stores, as the **Sub-Clip** parameter is adjusted the individual stills and clips are displayed in the minipic

Store Color Correction

The color correction part of the menu allows the user to change the color balance on each individual store or sub-clips, there are 4 types of control, YUV, RGB, Bleed and Preset.

To use the color correction options, press the **{Color...}** button.

Touching the **{Color Correction}** button to turn on the color adjustment.

Store Main/YUV

Touch the **{YUV...}** button to enter the **Store Main/YUV menu**.
The **Main** attacher displays the selected store/sub-clip, the name of the still/collapse attacher also displays the On/Off status of the YUV Control, RGB Control and the Bleed Control.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments made to a store/sub-clip will be turned Off; but not lost, they will all become active again when the Color Correction button is turned On.
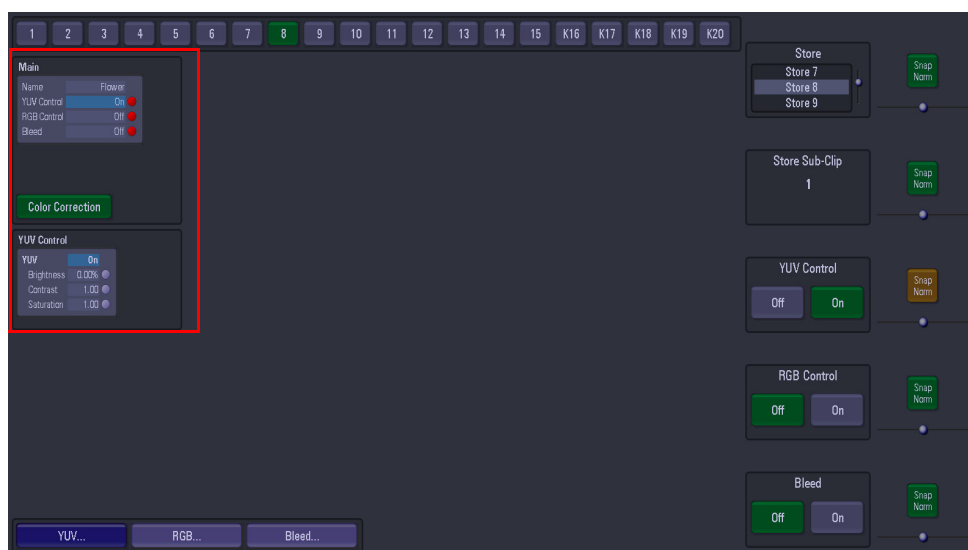
Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and Saturation of the store/sub-clip can be adjusted.

- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn Orange and the percentage of adjustment is shown.

Store RGB

Press the **{RGB…}** menu button to enter the **Store RGB** menu.

Here again, a store/sub-clip can be selected, the name of the store/sub-clip is also displayed. The initial menu is set to a default condition, which shows 3 Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Gain, Master S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time.

When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.

Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas.

Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

Bleed Menu

Color bleed is a situation where a single color will over power the other colors in the RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.

Again make sure the Source Correction is turned on.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attacher to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a -100% to a +100% scale. Each parameter menu will adjust a single color, i.e. red into red, green into red and blue into red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

Presets

Presets allow the user to quickly select commonly used preset color options for the crosspoint source, or quickly revert back to the original store/sub-clip color levels.

Normal - is the original color levels of the store/sub-clip; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original store/sub-clip can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

Store - FormatFusion

De-Interlace

A video signal is made up of 2 fields of picture per frame, the first field contains the odd lines of picture and the second field contains the even lines. Each time the Kahuna creates a new output picture an element of the previous and/or next field is used to fill the missing lines of picture. The Video De-Interlace function will allow the user control over the amount of picture taken from the adjacent fields.

If the source being used contains a lot of movement, e.g. sports, the difference in picture from one field to the next will be more pronounced than if the source is a static shot e.g. studio discussion then the Interlaced Source parameter should be used to compensate for different source types.

The Interlaced Source has 4 parameter settings, these settings are listed below:

Automatic is the default setting for Interlaced Source it is the most suitable mode for live programme making. When creating the current field/frame, the automatic setting will use the current input field and a percentage of both the previous and next input fields. Typically used when the output of a camera is fed to the switcher as a continuous stream of footage.

Video Pair is used when creating the current field/frame, will use the current input field and a percentage of either the previous or next field to maintain 1-2 or 2-1 pairing. This could be used for pre-prepared material with cuts on known field boundaries to prevent possible subtle artifacts appearing at cut points.

Film Pair is used when creating the current field/frame, will directly combine the current input field and either the previous or next field. This mode should only be used if the fields are temporarily matched, e.g. PAL film based sources or some animation.

Single Field is used when creating the current field/frame, will only use the current input field.

> Note: Field Dominance and Vertical Detail can only be used with selected Interlaced Source settings.

The **Field Dominance** control selects which field comes first. The **Normal** setting is the default field setting for the input standard, the **Reversed** setting should only be used to correct sources that have incorrect field order (swapped fields). Swapped fields will manifest as very jittery motion.

The **Vertical Detail** control, when in **Boost** mode will add some additional vertical sharpness to compensate for the vertical softening applied by interlaced cameras. This is intended to improve the quality of interlaced sources when up-converting.

FormatFusion^{TM}

The FormatFusion^{TM} controls allow the user to change the aspect of an store/sub-clip, this would be used for example if a portion of an HD still/clip needs to be cropped and stretched to fit a 16:9 format or an SD 4:3 still/clip aspect has to change to fit a 16:9 output.

The **Crop** adjustments allow the user to pan around the store/sub-clip to crop areas of the image that may need to be hidden from view. Adjustments can be made to the **Top**, **Bottom**, **Left** and **Right** of the image.

When the **Stretch To Fit** parameter is enabled the cropped picture content will stretched to fill the 16:9 area.

When the **Preserve Aspect** parameter is enabled, this will maintain the aspect ratio of the image e.g. For example, crop left and right the image will zoom vertically to compensate. If a source has become very distorted or stretched, this function will adjust the source outwards from the center in all directions creating a 'zoom in' effect.

> Note: This may cause a very small amount of the source material around the edge of the source to be lost.

HDR/WCG

> Note: For and explanation of the HDR functions, please see the HDR chapter in this User Manual.

Store - Contents

The Store - Contents menu shows a set of mini pics of stills and clips that are currently loaded into stores.

Note: For Clips the mini pic will show the center frame of the Clip.
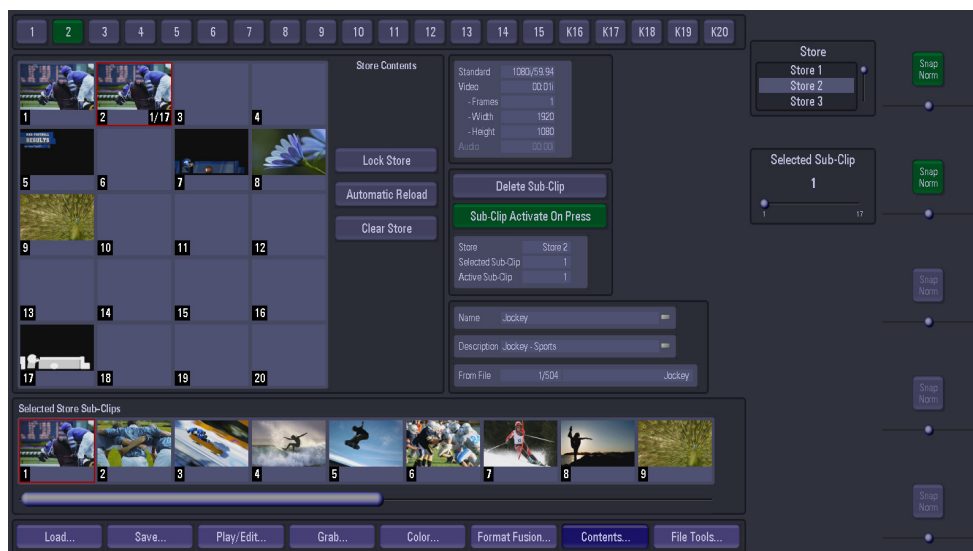
When scrolling through the Store parameter, the red box will move between each mini pic displaying the stills and clips associated with the selected store.
Bottom right of the menu displays the store details.

Locked Store - this will set a lock on the selected store in the **Store Contents** menu, the Store will display a padlock symbol top right corner of the mini pic (shown above). If the user tries to change the store once it is locked, a dialog box (shown below) will appear with options.

Automatic Reload - when set to Yes this causes the still or clip to be automatically reloaded from the hard disk whenever the original file location is updated. If the store contains something that was grabbed rather than loaded, then this has no affect.

Clear Store - this will clear the selected store contents

Sub-Clips - If a store contains Sub-Clips, the bottom right of a mini-pic will display the number of stills/clips contained within the store and the Sub-Clips parameter will also display the number of stills/clips contained within the store.

Number of Sub-clips

Sub-Clips

Sub-Clips is a function that allows up to 31 stills and clips to be loaded into a single store. This allows quick and easy access to stills and clips without having to load each store when it is needed.

List of Sub-Clips attached to a Store
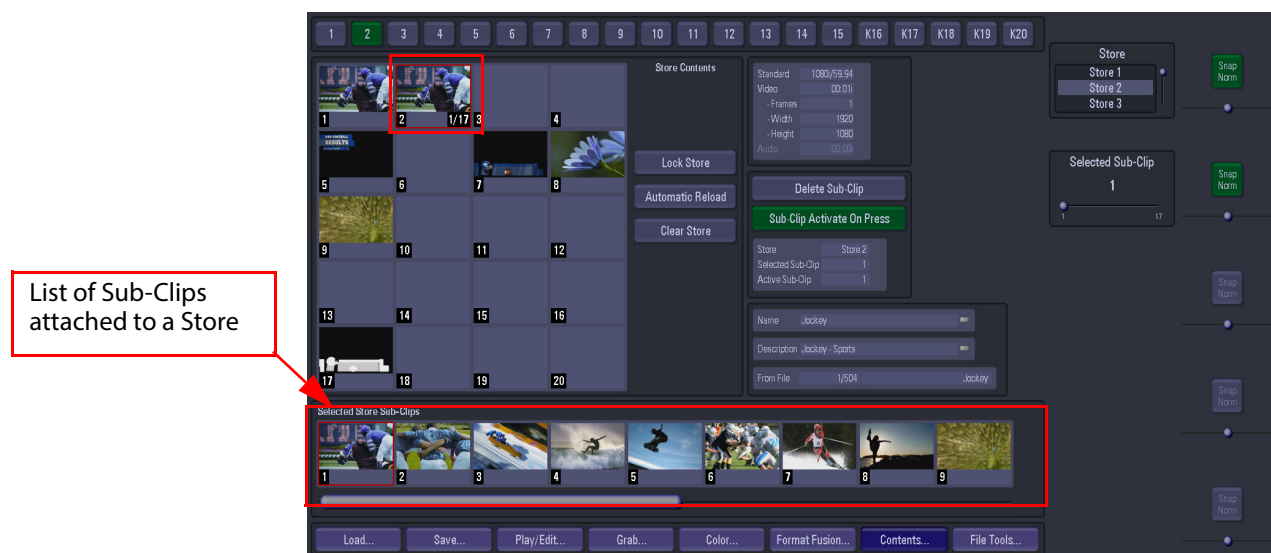
Creating Sub-Clips

As mentioned earlier, Sub-Clips are multiple stills and clips that have been loaded into a single store. Sub-Clips are created in the **Store Load** menu, using the **Load Mode** parameter.
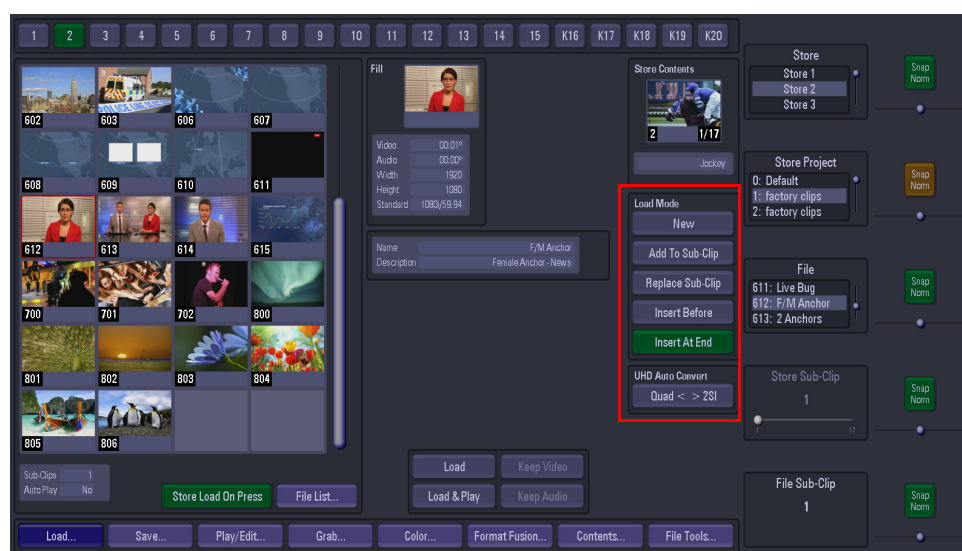
Select a store that will contain the sub -clips, then use the **Load Mode** parameter set to "**Add To Sub-Clip**" to start entering stills/clips. Touch a minipic and it will be added as the 1st sub-clip, look at the **Store Sub-Clip** parameter and it will have "1" highlighted. Set the **Load Mode** parameter to "**Insert At End**" and then each minipic that is touched will load a still/clip into the store as a sub-clip.

Up to 31 stills/clips can be entered into sub-clips for each store, in the Store Contents menu, the store that contains the sub-clips will have the number of stills/clips loaded at the bottom right of the minipic (as shown above in the right hand side menu).

To get to the Sub-Clips menu, enter the Store - Contents menu then touch the minipic that has the sub-clips, the Store - Sub-Clips menu will appear on the GUI.
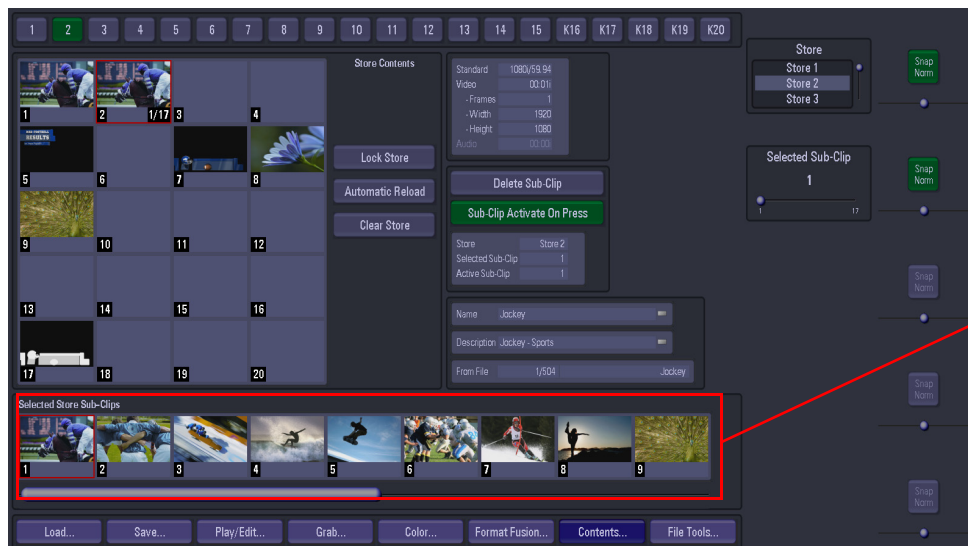
List of stills/clips in the Sub-Clips folder

Once in the menu, there is a scroll down list of minipics that are the stills/clips loaded into the sub-clips folder. Using the **Sub-Clip** parameter to scroll down the list of sub-clips, information regarding the video standard, length of clip etc. is displayed top left of the menu.
If the crosspoint that the store is mapped to is selected, then what ever sub-clip is selected will be displayed on a monitor.

Locked Store - this will set a lock on the selected store in the **Store Contents** menu, the Store will display a padlock symbol top right corner of the mini pic (shown above). If the user tries to change the store once it is locked, a dialog box (shown below) will appear with options.

Automatic Reload - when set to Yes this causes the still or clip to be automatically reloaded from the hard disk whenever the original file location is updated. If the store contains something that was grabbed rather than loaded, then this has no affect.

Clear Store - this will clear the selected store contents

Sub-Clips - If a store contains Sub-Clips, the bottom right of a mini-pic will display the number of stills/clips contained within the store and the Sub-Clips parameter will also display the number of stills/clips contained within the store.

Number of Sub-clips

File Tools

The File Tools menu allows various operations on several existing stills files to combine them into new single stills files.
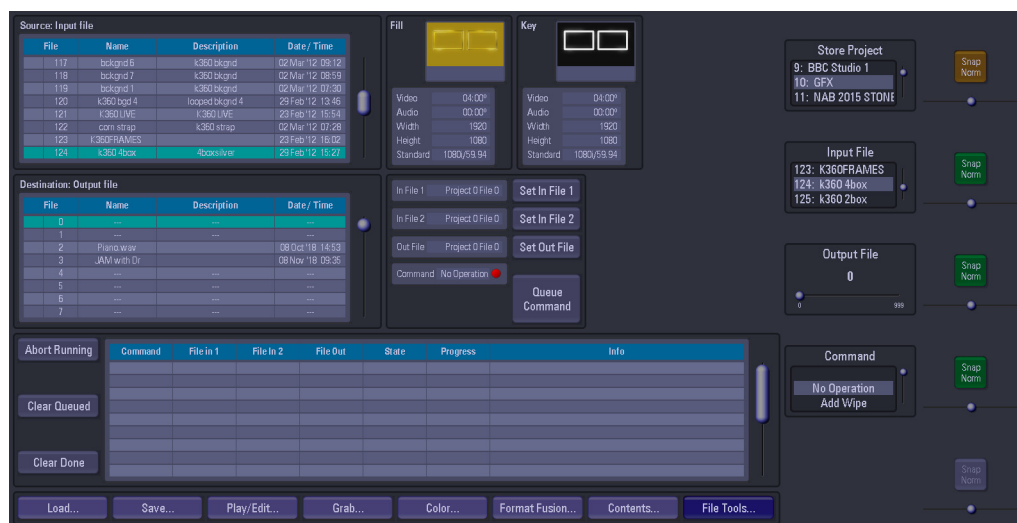
These operations are:

1. **Add Wipe** - This tool allows the user to add a wipe signal animation to an existing Fill & Key file creating a single file which contains Fill, Key and Wipe clips for use in a Clip Wipe transition.

2. **Auto Crop** - Many file such as ident logos, LIVE bugs or small captions will have a frame which is mostly black. This tool automatically crops the image to remove black edges. This results in much smaller file sizes and reduced load times. The position of the graphic within the frame is preserved using the Pan settings which are automatically set and saved in the file.

In the example below a "**LIVE"** bug occupies a small portion of the screen (fig a). Normally the entire frame will be saved in the file but the Auto Crop tool removes the area from each edge up to the start of any part of the frame which is not black. This area is not saved (the hatched area in fig b). When the file is replayed, the removed area is replace with black restoring the original image.
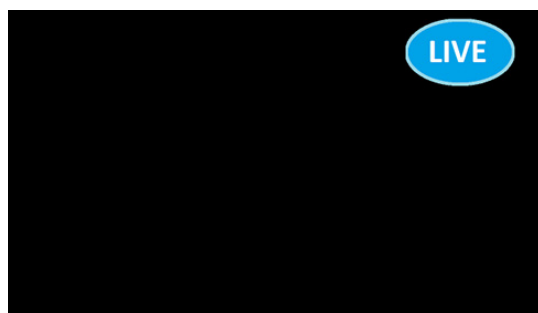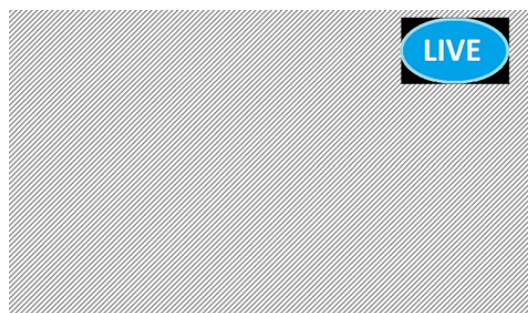
Fig. a   Fig. b

Where the file is a clip, the entire clip is analyzed to determine the crop area for the entire clip.

3. **Auto Crop Key** - This is the same as Auto Crop but should be used where files include a key signal.

4. **H Stitch** - Two images can be joined together to produce a double width image which can then be navigated using the Pan control

5 **V Stitch** - As H Stitch but the join is done to produce a double height image.

To use any of these tools you need to select each file in the "Source" table and pressing the Set In File 1 and Set In File 2 (where appropriate) buttons accordingly. An empty file location should then be selected in the "Destination" table. Instructions appear on the GUI for the selected tool type.
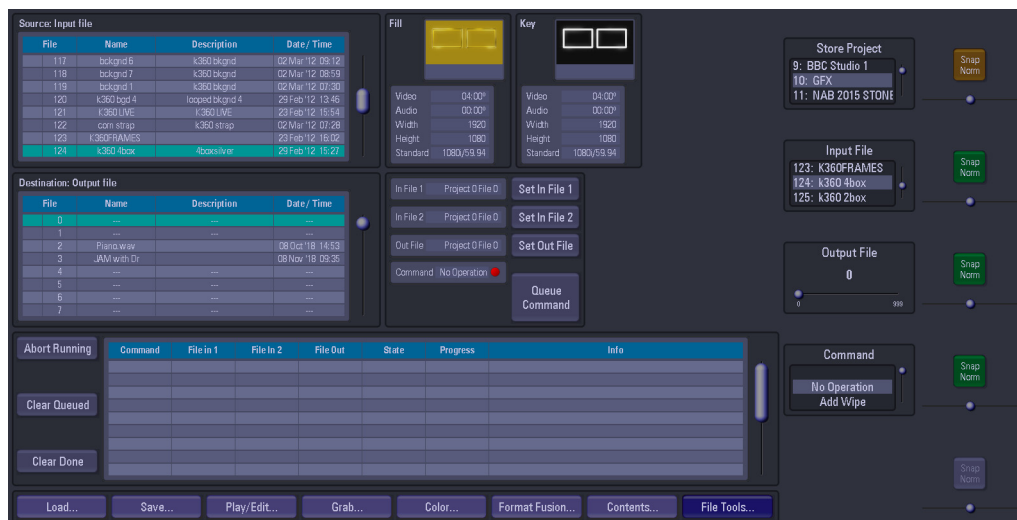
Hitting the Queue Command button will start the process and the results are shown in the table at the bottom.

Crosspoint Mapping

Crosspoint Mapping Overview

The crosspoint mapping menu is where all the physical inputs to the mainframe and all the internal sources are mapped to the Crosspoints using the crosspoint mapping table. The crosspoint map has been setup in a factory default state, and functions like the Key and Fill for coupling stores, and the Mattes/Washes have all been setup. Which means less work for the user.

Note: It is recommended that the crosspoint mapping setup remains in the factory default one-to-one state. User defined crosspoint setups should be created in the Panel Config - Button Maps menu.

If the crosspoint map is going to be changed or modified, touch the attacher below the crosspoint map table and a new set of parameter controls will appear on the GUI.
Using the parameter controls, will allow any crosspoint to be re-mapped to any of the physical inputs or the internal source, change the Key and Fill associations, setup the legend lamp for the mnemonic displays on the control surface and re-name the crosspoints.
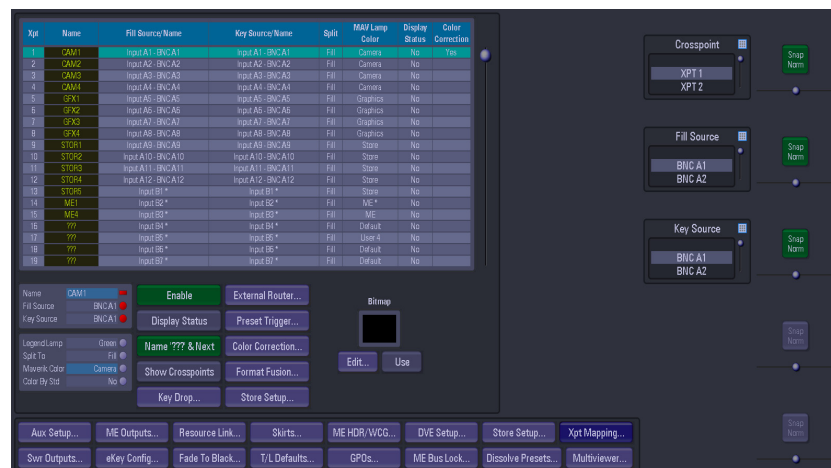
Crosspoint Map table has five columns, the columns left to right contain the crosspoint number, the name of the crosspoint, the Fill and Key sources and the Split column.
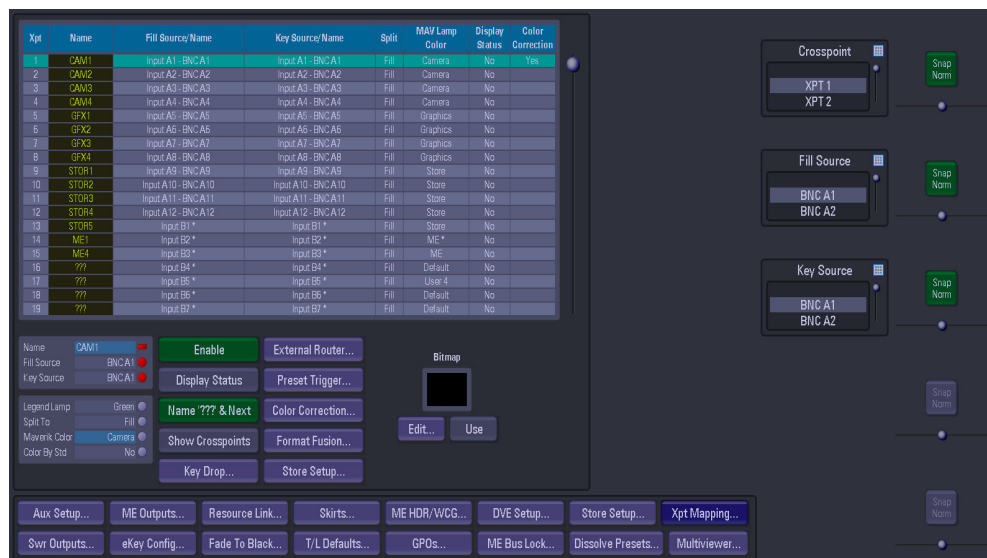
Xpt- crosspoint 1 to 275. Use this parameter to scroll down the list of crosspoints.

Name - This column is for a crosspoint name that the user can set using a USB Keyboard (this is indicated in the attacher at the bottom left part of the menu where a red rectangle is against "Name"). When giving a name to the crosspoint, up to 11 characters can be entered, the characters font will vary in size and height depending on how many characters are typed in, that means characters 11 maximum.

The next two columns are used to set the actual source to be mapped to the selected crosspoint and to give the source a name.

Fill Source / Name - This column is used to set the Fill Source, which is the signal that provides the Fill when selected on a Key bus or provides the source for the background buses.

Key Source / Name - This column selects the Key Source which provides the Key (hole cut) signal when selected on a Key bus. It has no effect when selected on a background bus.

Split To - this function is used when the user wish to use a Fill or a Key source to give you a key signal for the Key layer. Split to Fill/Key means that the setting on the crosspoint the user has "Split", will determine a Key signal for the Key layer.

MAV Lamp Color - this is a scroll through list of preset colors and sets colors for crosspoint buttons on a crosspoint by crosspoint basis. Once the colors are set, as the Crosspoints are assigned to the control surface, the buttons on the control surface will be lit according to the Maverik Color set in this parameter.

Function Buttons
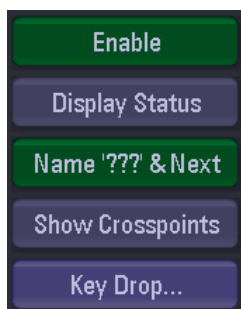
Enable - this function enables/disables the selected crosspoint. When disabled, the crosspoint "Name" will display as "Disabled" and the panel mnemonic is left blank.

{Name '???' & Next} - this button is a quick short cut, it puts '???' into the current Source Name and then jumps on to the next Source in the list, forcing the switcher to take the Name from the Source itself, this helps to make naming all sources quicker.

{Show Crosspoints} - this button when pressed will go Green, this will cause the mnemonic display on the control panel to change and show the crosspoints in their "unnamed" form, i.e. XPT1, XPT2, XPT3 etc. Press again to go back to the user specific crosspoint setup.

Key Drop

A simple explanation for Key Drop is that it allows the user to automatically switch off (drop) an active Key every time a new source is selected by cutting directly on the Program or Bgnd. Touch the {Setup} menu link tab at the top of the menu, then touch the {Key Drop} button to open the "Simple Key Drop" menu.
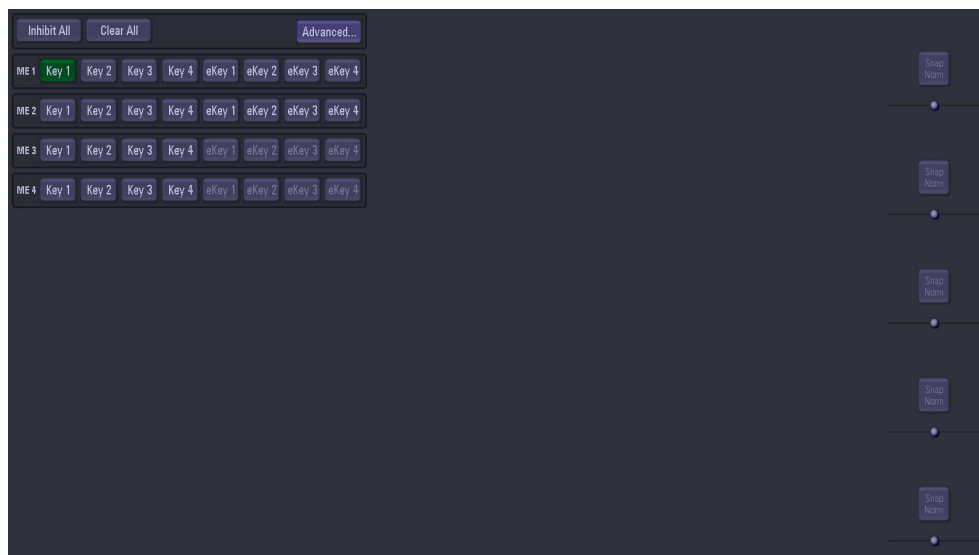
In this top menu or "simple" menu, the user can select a Key, from the list of available M/Es (the selected Key will turn green).

When that Key is selected on the Pgm or Bgnd A Bus, on the selected M/E, the next Xpt button selected on that Bus will drop the Key. Notice that the Key is now shown on the Preview or Bgnd B Bus. Using the T-bar or **{CUT}**/**{AUTO}** buttons, will place the Key back on the Program or Bgnd A Bus, then next Xpt button pressed will drop the Key again.
Inhibit All - when this is lit, no Key Drop functions will be active.

Clear All - removes all Drop/Add settings from the Simple and Advanced modes.

The "**Advanced**" menu (touch the **{Advanced}** button) provides a more powerful automatic control of Keyer on/off state which is dependent on the crosspoint selected on the Bgnd A Bus.
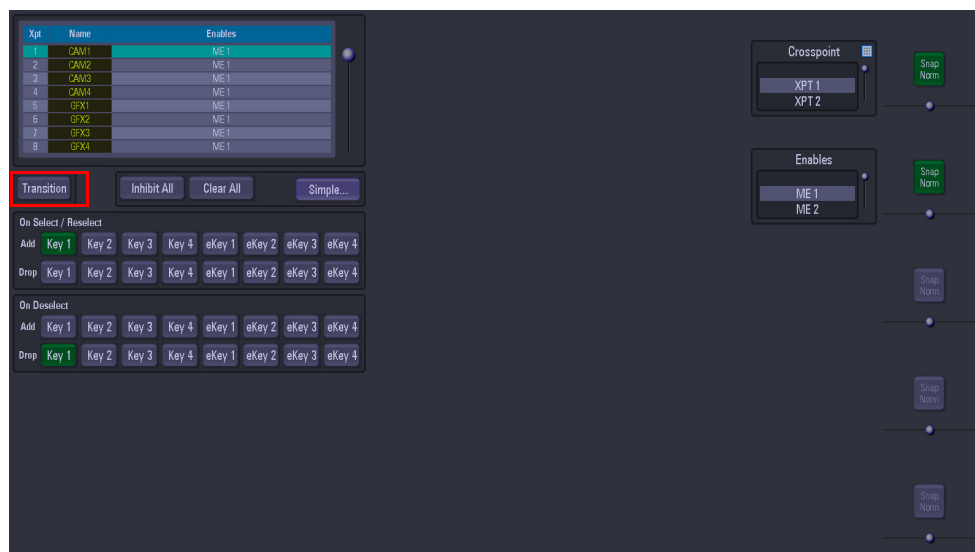
This mode provides the user with the ability to have a Keyer active whenever a particular source is on-air by setting rules for every crosspoint and including automatic selection of the In Transition selection to ensure the Keyer state is controlled by the Transition control.

> Note: Key Drop settings are stored in User Config files

By selecting a Keyer on an ME, that Keyer will always turn off whenever a source is changed by directly cutting on the Program or Bgnd A Bus.

> Note: If a Keyer has rules set in the Advanced mode, then this will be indicated by a Gold color on the Soft MLC GUI or a half lit button on the MAV-GUI.

The Inhibit All and Clear All functions for Key Drop can also be found on these menu pages. Each source can have rules set to Add or Drop a specific Keyer on each ME whenever that source is selected on the Program or Bgnd A Bus of that ME.

Transition

By switching on this button, the selected ME will automatically set the In Transition states for each of the Keyers which have Add/Drop rules applied in the Advanced Mode, depending on which Crosspoints are selected on the Bgnd A and B Bus. The In Transition buttons will light in the Alert color to indicate that this In Transition state has automatically been set. The state of other Keyer and background In Transition states will not be changed. The automatically set states can be deselected by the user before the transition is made.

Example:

The advanced state is extremely useful for situations where the user wants a source always to have a Keyer active, for example a remote source which always has a "Graphic" bug included in the picture.
Select M/E1 in the menu table. If the remote source is Xpt 1 and the bug is set up on Key 1 on M/E1, the user would need to go into the Advanced menu and select Xpt1 as the crosspoint and ME1 in the enables.
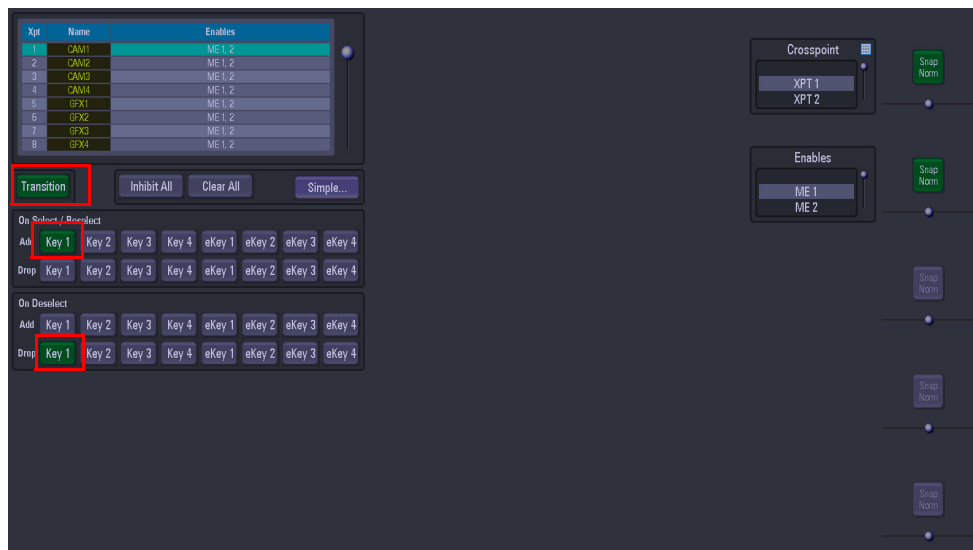
Touch **{Add} {Key1}** in the "On Select/Reselect" control

Touch **{Key1}** in the On Deselect control

Touch **{Transition}** to light this control.

Every time the remote source is put on the output of ME1 the "Graphic" bug will be included the picture.

> Note: Re-selecting a source which is already on the Program or Bgnd A/B Buses will reapply the appropriate In Transition rules. This could be useful if the rules are inadvertently changed, for instance, by adding another Key to the transition.

External Router

Kahuna has the mechanism to expand the number of sources coming into the mainframe using an external router. This is primarily due to a system setup running in UHD. Using this new feature, the number of sources to be used with the Kahuna, are expandable up to the size of the upstream router.

Kahuna Intelligent Tie Line Concept

Kahuna deploys an intelligent "Tie Line" approach, the desired external router outputs (destinations) are connected to Kahuna inputs. These inputs on the Kahuna and destinations from the Router are treated as "Tie Lines". Each Tie Line acts as a floating video bus between the router and Kahuna, they are intelligently assigned and used as required.

Source selection on any Bus is transparent to the operator, regardless form where the Xpt is being made, i.e. in the external router, or in the Kahuna itself.

The Kahuna software knows what physical inputs / Tie Lines are allocated and what are not being used on a bus. Kahuna then assigns the Physical input /Tie Line to the desired Bus upon a source selection. Kahuna updates the upstream router's destination /Tie Line with the selected source.

Source selection on any Bus is transparent to the operator. Once setup, the operator sets the desired router source by selecting the appropriate router XPT on the required bus. The selection on the external router and the Tie Line path into the Kahuna is automated.

Software Version:

Requires V7.7r1 software onwards

How many Tie Lines?

How many Kahuna inputs do you need to convert to Tie Lines? This is entirely dependant on a few external factors, such as:

How many inputs available on the Kahuna (max number shown below):

- HD = 120 Tie Lines
- UHD = 30 Tie Lines
    - How many router destinations are available.
    - How many router sources need to be selected on Kahuna at any one time.

For example:
If the user wants to select different external router sources on the A and B bus of ME2 this would require 2 Tie Lines.

For HD this would require 2 router destinations and 2 Kahuna inputs.

For UHD this would require 8 router destinations and 8 Kahuna inputs.

If the user requires external router sources on the A and B bus plus Key 1 and Key 2, this would require 4 Tie Lines.
In summary: Each different external router source selected simultaneously requires a Tie Line. Each Tie Line requires one router destination and Kahuna input in HD, or 4 router destinations and 4 Kahuna inputs in UHD.

> Note: If at all possible, it is recommended that the user creates more Tie Lines than are actually required. This gives some redundancy and reduces the risk of the system running out of available Tie Lines.

Setup

Protocol Setup

To setup the protocol, the user will have to go to the **"Eng Config - Protocols"** menu. Use the **"Protocol Type"** parameter to select **"Router"**, then, use the "Available Protocol" parameter to select the required protocol. For this example, **"SW-P-08 Router"** is selected. Touch the **{Load}** button to add the protocol to the "Loaded Protocols" table.
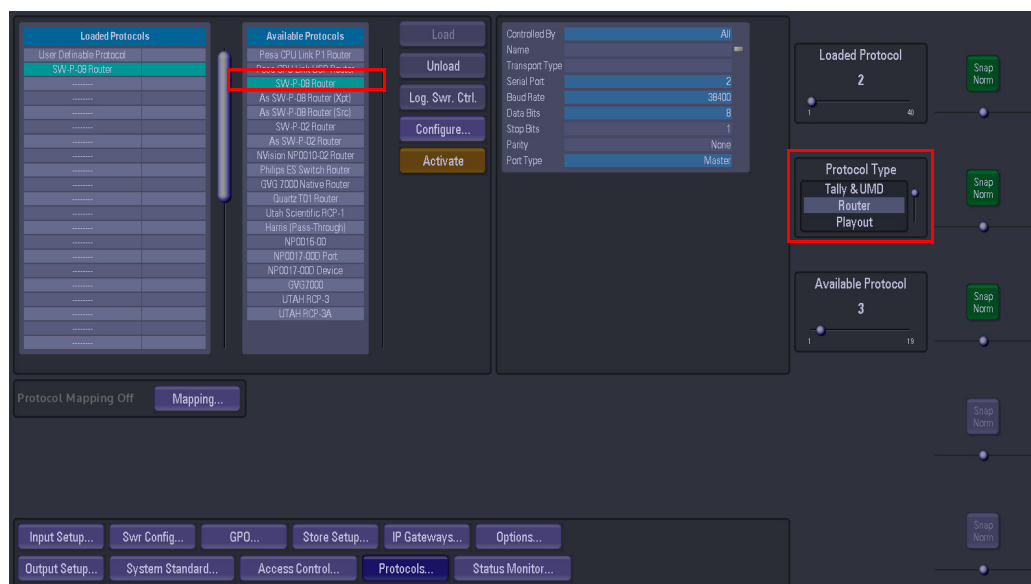
The user will now have to configure the protocol so that Kahuna can communicate with the router. Touch the **{Configure…}** menu link button and the **"Protocol Config"** menu is displayed. Use the "Transport Type" parameter to select the communications transport type, then, setup the **"IP Client Configuration"** details.
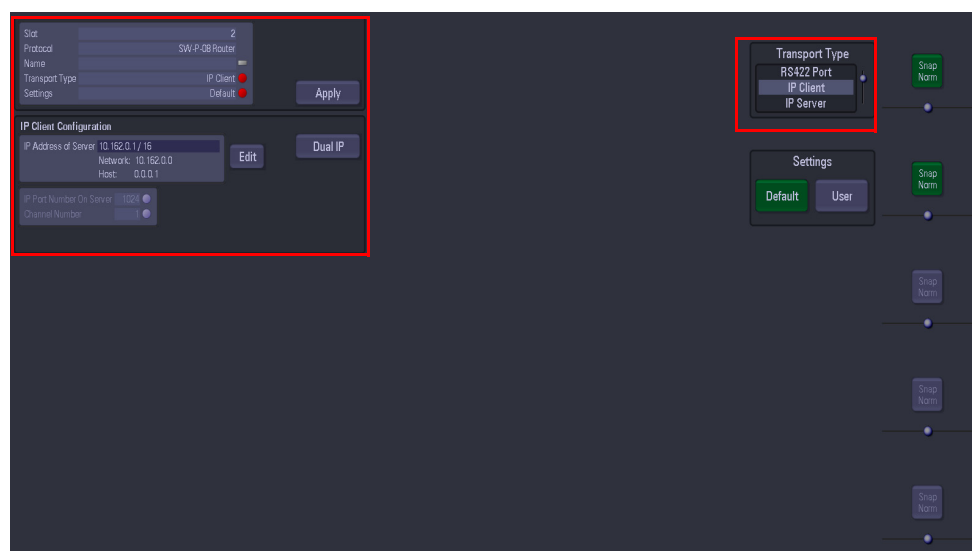
Once setup, touch the **{Apply}** button.

Then back in the Peripherals main menu, touch the **{Activate}** button to activate the protocol.

Peripherals Setup

Touch the **{PERIPH}** button to enter the "Peripherals" menu. Then touch the **{Router Control…}** menu link button.
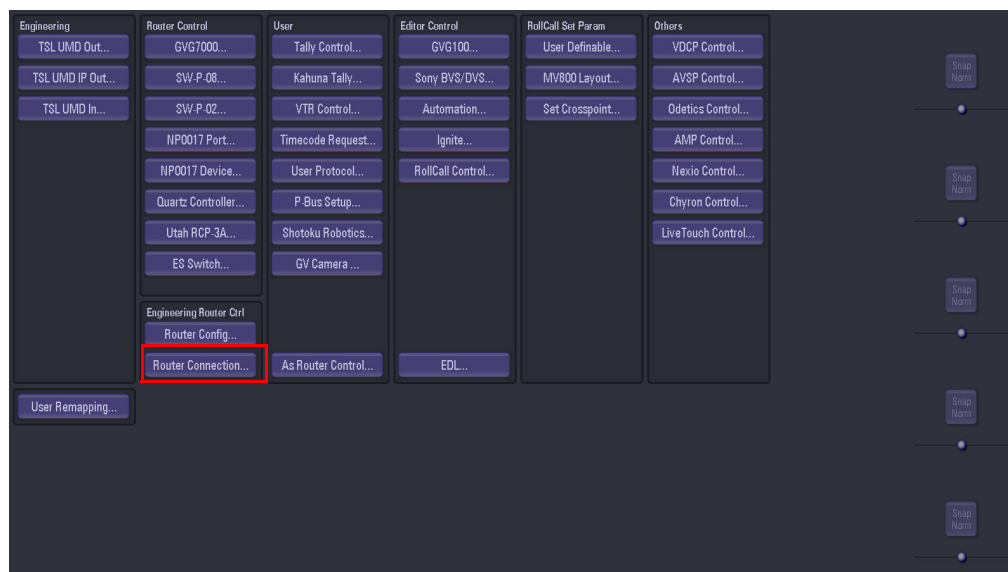
Then select **"Router Connections"**. Here the physical router outputs (Including Matrix and Levels) need to be mapped to the physical Kahuna inputs. These connections will form the "Tie Lines".
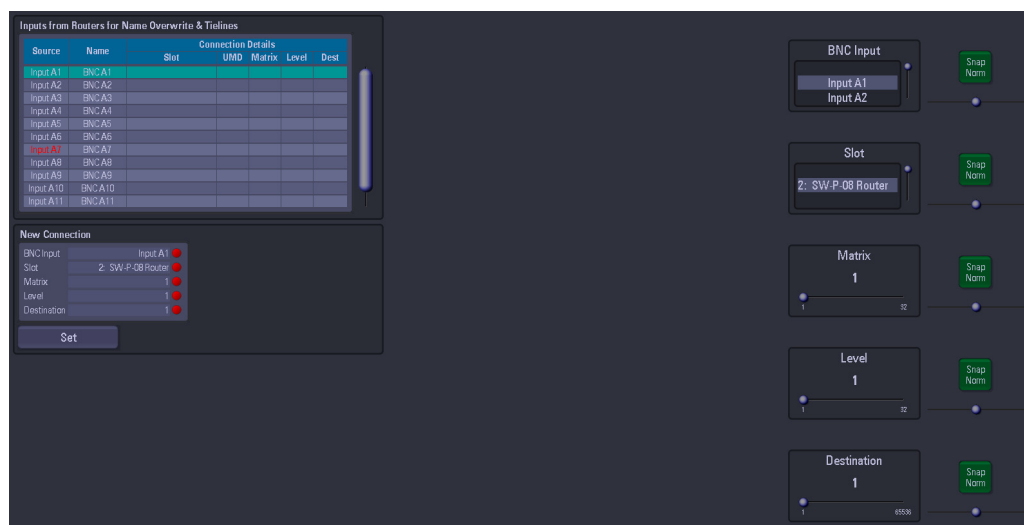
After each router connection row is set, touch the **{Set}** button.

Setting Up Names and Tie Lines

Next, go to the **"ENG Config - Input Setup - Names & TileLines"** menu.
In this menu, select the BNCs that where set to connect to the router destinations in the "Peripherals **- Router Connections"** menu and set them to "TieLine **= Yes"**. Do this for all the inputs that will become Tie Lines from the router.

Note: For inputs that are set as "TieLines", it is recommended that the "Source **Standard"** parameter (in the **Eng Config - Inputs** menu) is set to "Auto Standard" and the "Color **Correction"** function is set to "Off". If color correction is required then it should be done on the external router XPT.

Note: It's recommended that sources which are off standard (and therefore requires format conversion) do not come via Tie Lines if hot cutting is required.

Make sure at this point to "Overwrite" or "Save" the ENG Config setup.

Setting up the User Config - Crosspoint Mapping - External Router configuration

In the "Crosspoints" Crosspoint Mapping menu, touch the **{External Router…}** menu link button.

In the **"External Router"** menu, select free Xpts that are not being currently used, there are a total of 160 variable Xpts available. Each external router source required on the Kahuna will need its own router Xpt.
Use the "Crosspoint" parameter to select the required **"Xpt"** and then touch the **"Fill Source"** attacher to enable the parameters and set the **"External"** parameter to "**On**"

Touch the attacher below the **"Fill Source"** attacher, then use the parameter controls to set the "**Matrix, Level and Source**" for the selected XPT (originally set in the **"Peripherals - Router Connections"** menu).

> Note: If the source is UHD set the "UHD" to "Yes". When in UHD mode the 4
> quadrants or streams from the router have to be consecutive.

If the router has its sources and destinations ganged as UHD then set "**UHD Router**" = Yes. This differentiates between the control protocol setting 4 router Xpts (un-ganged) or just the first router XPT (ganged).

"**Name From**" - Router means the name is fed into the Kahuna from the external router (should the protocol allow this).
"**Name From**" - Crosspoint uses the internal XPT name as set in the User **Config - Crosspoint - Name** menu.

Repeat the above for the "**Key Source**" for the Xpt if required. Otherwise it's recommended to set the Key source to black or white for the external router XPT.

Make sure at this point to "**Overwrite**" **or** "**Save**" the User Config.

Operation

The Router Xpts can be mapped to the buttons on the control panel as per normal using the Panel Config - Button Maps menu.
The operator just selects the router XPT as per any other source and its fed via the Tie Lines from the external router.

> Note: If too many router sources are selected for the Tie Lines available the following warning is displayed

"**Insufficient Router Tie Lines"**

In this instance either extra Tie Lines need to be added, or router XPTs deselected from buses if not required.

Timing

If the source switch on the external router is changing later than Kahuna, the timing can be adjusted. This will delay the cut on the Kahuna to ensure the router switch is complete.

Peripherals - Router Control - Router Config

Adjust the "**Cut Delay**" until clean switching is achieved.

For routers that use the SWP08 protocol the Fast Protocol selection can be enabled. This sends out multiple commands per video field. It will depend on the implementation of SWP08 whether this mode works.
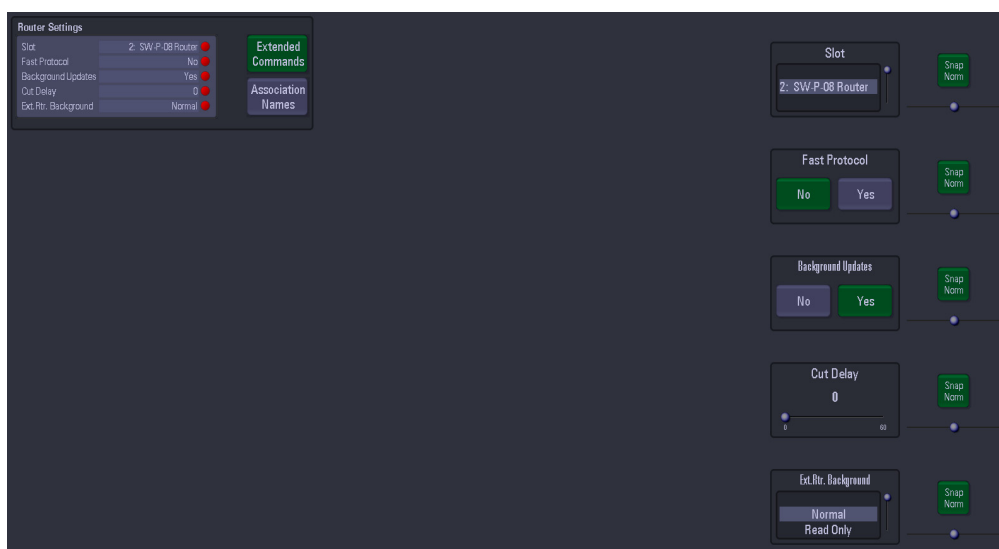
Preset Trigger

Preset Trigger is a function which allows a Macro to be triggered whenever a particular crosspoint is selected onto the output of an M/E, using a transition on the Transition Panel. A Preroll Delay can be specified which will delay the actual transition for a specified duration after the Macro has been triggered.

> Note: The Macro will only be triggered by a transition made on the Transition area of the control surface, i.e. Cut, Auto or a physical transition of the T-Bar. It will not be triggered by a cut made directly on a bus row, i.e. "hot cutting" along the on-air bus.
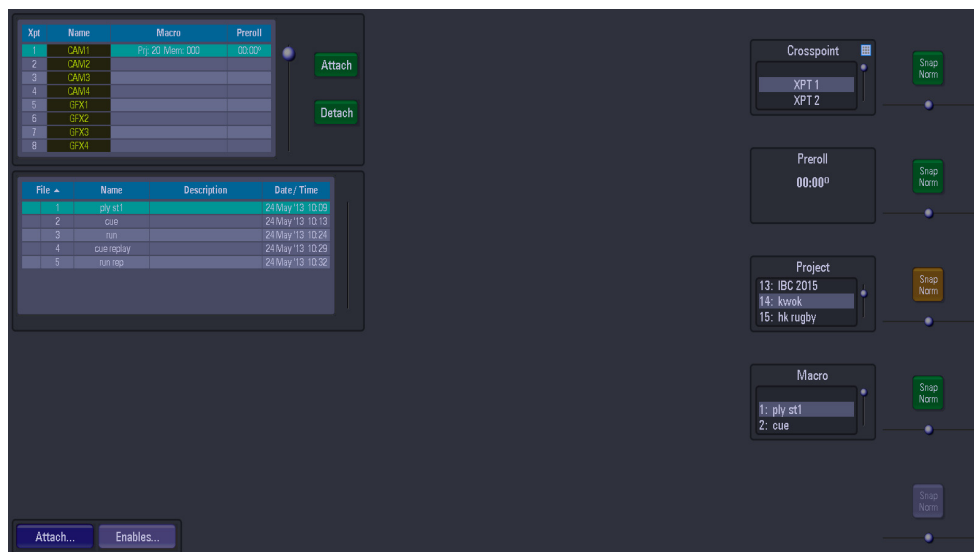
The Preset Trigger menu is accessed from the Crosspoints menu. In the Crosspoints menu, touch the **{Preset Trigger...}** button.

Firstly the operator needs to select the Xpt which will be used to trigger the Macro. This is done either by touching the relevant Xpt in the top table, or by using the parameter top right of the menu.
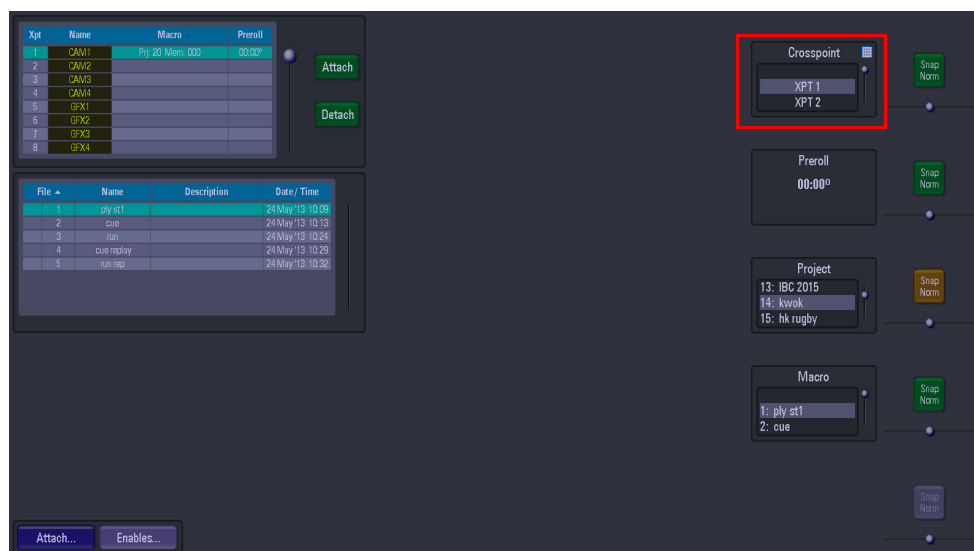
Next, use the "**Project**" parameter to select the project that contains the required macro. Then use the "**Macro**" parameter to select the macro that will be triggered when the crosspoint is selected by a transition.
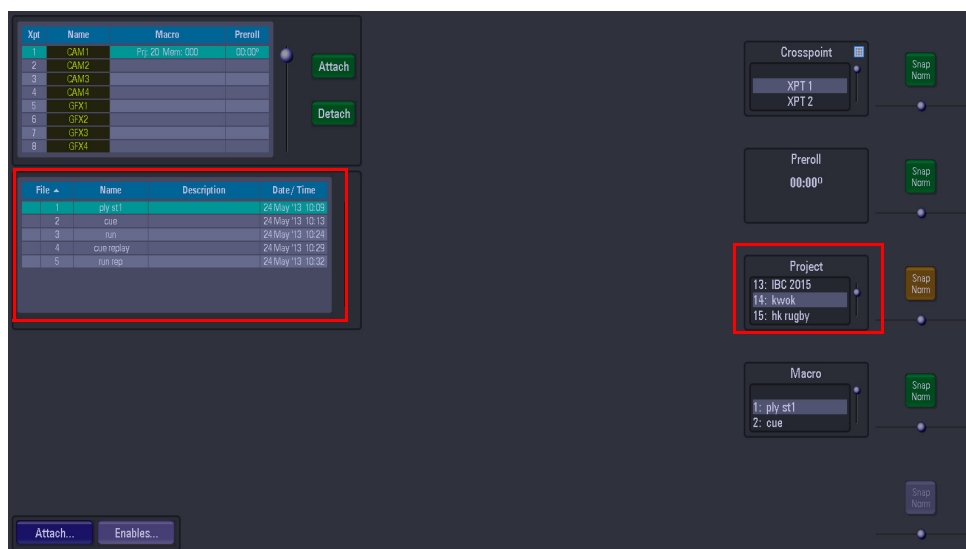
Once all the parameters are selected in the above menu, touch the **{Attach}** button to attach the macro to the crosspoint.

Touch the **{Enables...}** button to display the Enables options to set which M/E and which Bgnd, Key the transitions will actually trigger the Macro.
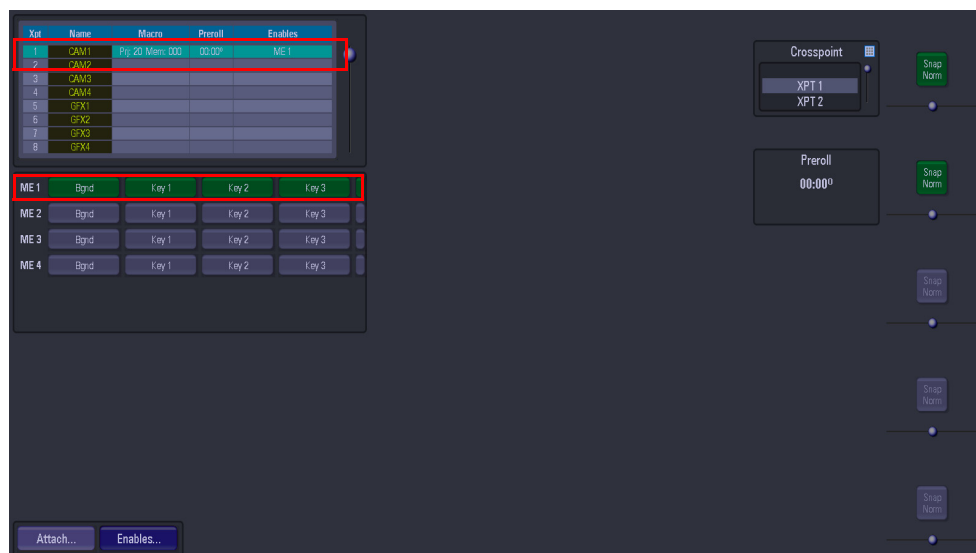
By selecting Xpt 1, then selecting M/E1, Bgnd and Keys 1 - 4, the Macro will be triggered whenever a transition is made, which will bring "Xpt1" onto the output of "ME1" using a transition on the Background or any of the 4 Keyers.
A Preroll can be set which will delay the transition until a pre-determined time after the Macro has been triggered.

Color Correction

Crosspoint Correction is comprised of two functions within one menu and incorporates:

- **Color Correction** - color correction for individual crosspoints.
- **FormatFusion** - utilizing the FormatFusion3™ and FormatFusion™ engines to change the aspect ratio of a crosspoint source.

The above functions are applied on a crosspoint by crosspoint basis, and are saved when saving a User Config, so it is important to check that any work done was created in the required User Config before saving.

Color Correction Controls

FormatFusion Controls

Color Correction

The color correction part of the menu allows the user to change the color balance on each individual crosspoint, there are 4 types of control, YUV, RGB, Bleed and Preset.

To use the color correction options, press the **{Color Correction}** button in the main menu and the button will go Green.

Xpt Color - YUV

Press the **{YUV...}** button to enter the **User Config - Xpt Color - YUV** menu.
The **Main** attacher displays the selected Crosspoint, the name of the Source on the Xpt, and the name given to Xpt.
The attacher also displays the On/Off status of the YUV Control, RGB Control and the Bleed Control.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments made to a Xpt will be turned Off; but not lost, they will all become active again when the Color Correction button is turned On.

Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and Saturation of the Xpt can be adjusted.

- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn Orange and the percentage of adjustment is shown.

Xpt Color - RGB

Press the **{RGB...}** menu button to enter the **User Config - Xpt Color- RGB** menu.

Here again, a crosspoint can be selected, the source is also displayed. The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time. When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.
Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas.

Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

Bleed Menu

Color bleed is a situation where a single color will over power the other colors in the RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.

Again make sure the Source Correction is turned on.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attacher to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a -100% to a +100% scale. Each parameter menu will adjust a single color, i.e. red into red, green into red and blue into red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

Presets

Presets allow the user to quickly select commonly used preset color options for the crosspoint source, or quickly revert back to the original crosspoint source color levels.

Normal - is the original color levels of the crosspoint source; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original crosspoint source can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

FormatFusion^{TM}

The FormatFusion controls in this menu allow the user to change the aspect ratio, zoom and position of a crosspoint source.
This function would most commonly be used to change the aspect ratio of a 525 or 625 4:3 source to a 16:9 aspect ratio, using the Kahuna FormatFusion engines.

Original 4:3 Crosspoint
Source on a 16:9 background

With Full Width Applied

With Full Height Applied

With Zoom Applied to fill 16:9
Aspect

Aspect Mode has 3 settings: **Zoom**, **Full Width** and **Full Height**.

The **Zoom** parameter allows the crosspoint source to be zoomed out to fill the 16:9 aspect, when the source is zoomed to 16:9; it will appear slightly larger. The zoom function will not work if the aspect is set to Full Width or Full Height.
The **Full Width** parameter changes the aspect so that the full width of the 16:9 aspect is filled, in this setting a letter box effect is seen where there are bars at the top and bottom of the image.

The **Full Height** parameter will change the aspect so that the full height of the 16:9 aspect ratio is filled, leaving bars either side of the image.
The **X and Y Position** allow the source to be re-positioned within the 16:9 space.

The **Crop** adjustments allow the user to crop areas of the image that may need to be hidden from view. Adjustments can be made to the **Top**, **Bottom**, **Left** and **Right** of the image.

Pressing the **{Format Fusion...}** button will switch menu's to the **User Config - Xpt Format Fusion** menu.

This menu has all the same aspect ratio parameter controls as in the Crosspoint Correction menu, but has a table that displays each crosspoint and any individual settings made to the crosspoint (as shown above).

Transitions Overview

This section of the manual will describe the Key and Background Transition functions.

The Transition menu is accessed using the MAV-GUI and the GUI.

Transition Controls

The two main types of transition that will be described in this section of the manual, these are:

- Background Transitions
- Key and eKey Transitions

Note: When the system has gone through the startup sequence, each of the transition T-bars need to be calibrated by moving the T-bars from end stop to end stop position.

Transition Menu

The user is able to easily select what they want to transition i.e. Background or Key by touching **{TRANS}** button to open the "Transition" menu.

Setting Basic Transitions

Independent transitions can be set for the Background and for each of the Key Layers.
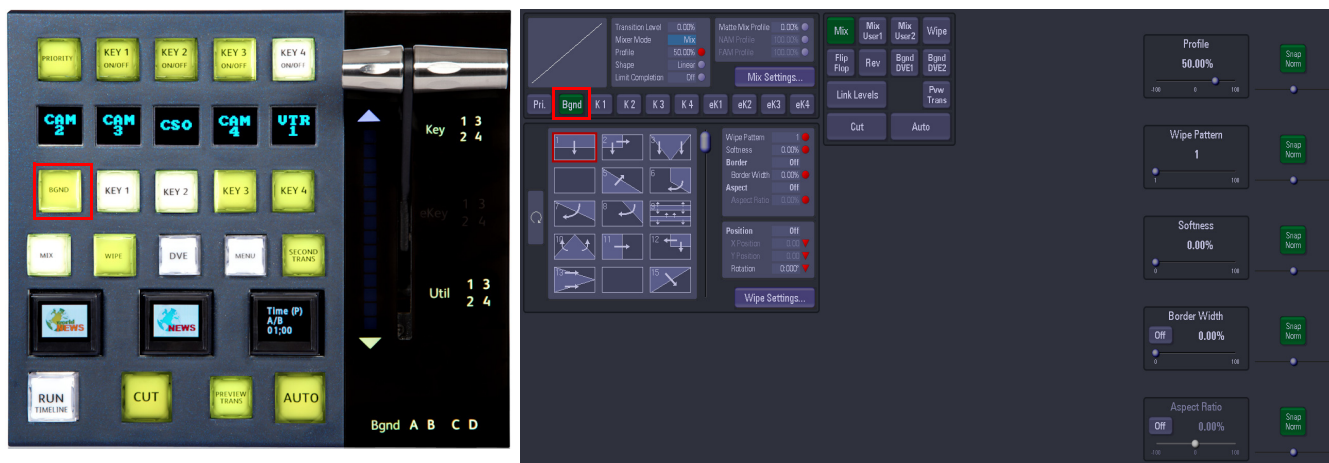
Basic Background Transitions

Press the **[BGND]** button on the control surface and it will light up (white in the default state), move the T-bar from end to end and notice that a transition is made between the selected crosspoint sources on the background A/B or C/D bus for that M/E bank.

Basic Transition with a Wipe

With two monitors displaying two different backgrounds on the Pgm and Pst monitors. Press the **[BGND]** and **[WIPE]** buttons on the MAV-Trans area of the control surface.
Next, in the "**Transition**" menu, touch to select one of the wipe patterns displayed in the menu. When the "Tbar" is moved from end-stop to end-stop, notice that the selected wipe transitions between the two background images.
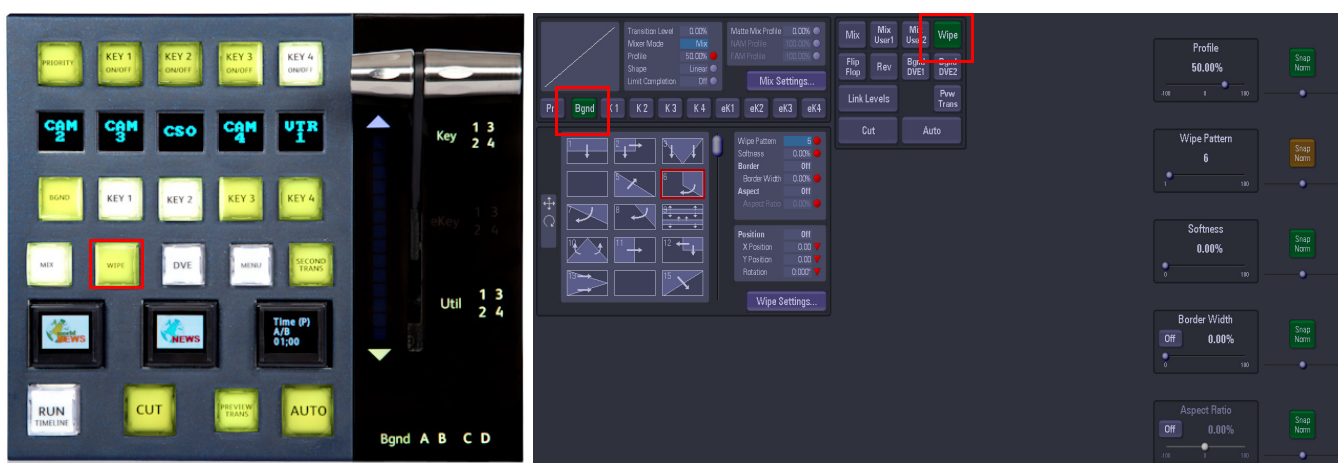
Basic Key Transition

With a Key transition, touch one of the Key buttons, **[KEY1]** to **[KEY4]** button on the control surface and it will light up (white in the default state), move the T-bar from end to end and notice that a transition is made between the selected Key sources for that M/E bank.
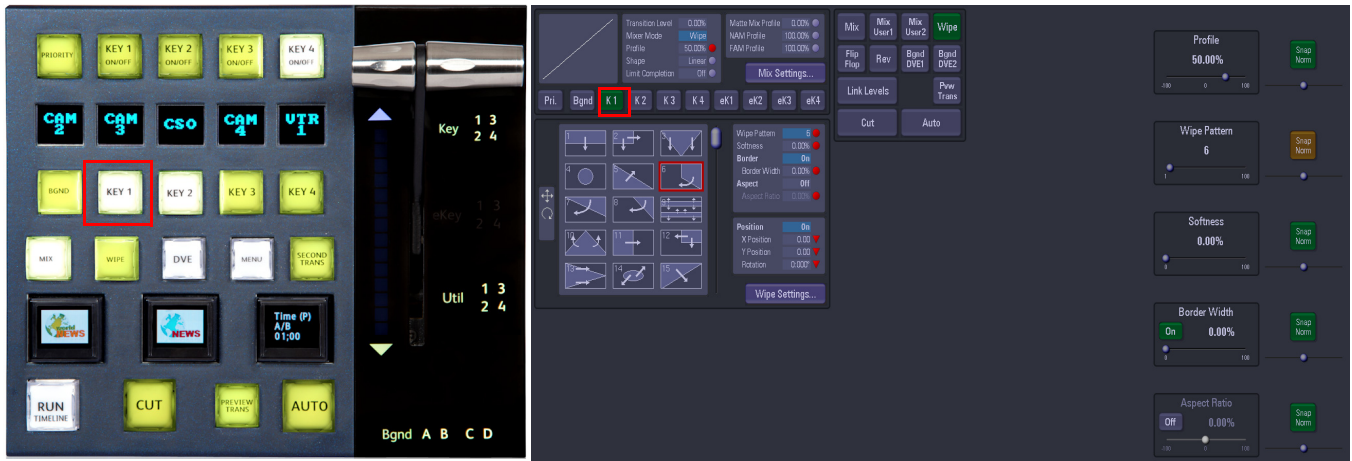
Basic Key Wipe Transition

Press the **[KEY1]** to **[KEY4]** and **[WIPE]** button on the MAV-Trans area of the control surface, or the **{WIPE}** button in the menu.
Next touch the **{TRANS}** button on the GUI, to go to the "Transition" menu and touch to select one of the wipe patterns displayed in the menu. When the "Tbar" is moved from end-stop to end-stop, notice that the selected wipe transitions the key layer from the Pgm to the Pvw monitors.
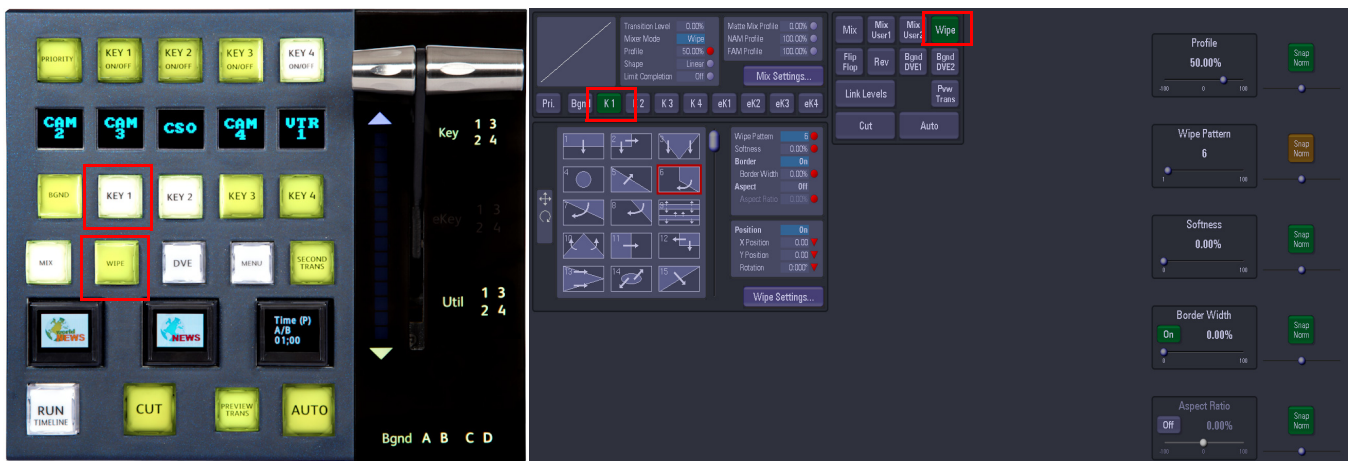
BGND Key Transition Buttons

On the **MAV-TRANS** module, selection of active Keys to be added for a transition can be selected easily by simply double hitting the **[BGND]** twice.

With Keys selected in the transition area as shown above, double hitting the **[BGND]** button will turn "On" the equivalent Keys On for the next transition.

Touch the **[BGND]** button once more to turn the Key transition buttons Off.

This doesn't require any changes to be made in the "**Panel Config - Panel Preferences"** menu.

Transition Control Button Functions

Displays the selected source

Programmable LED buttons
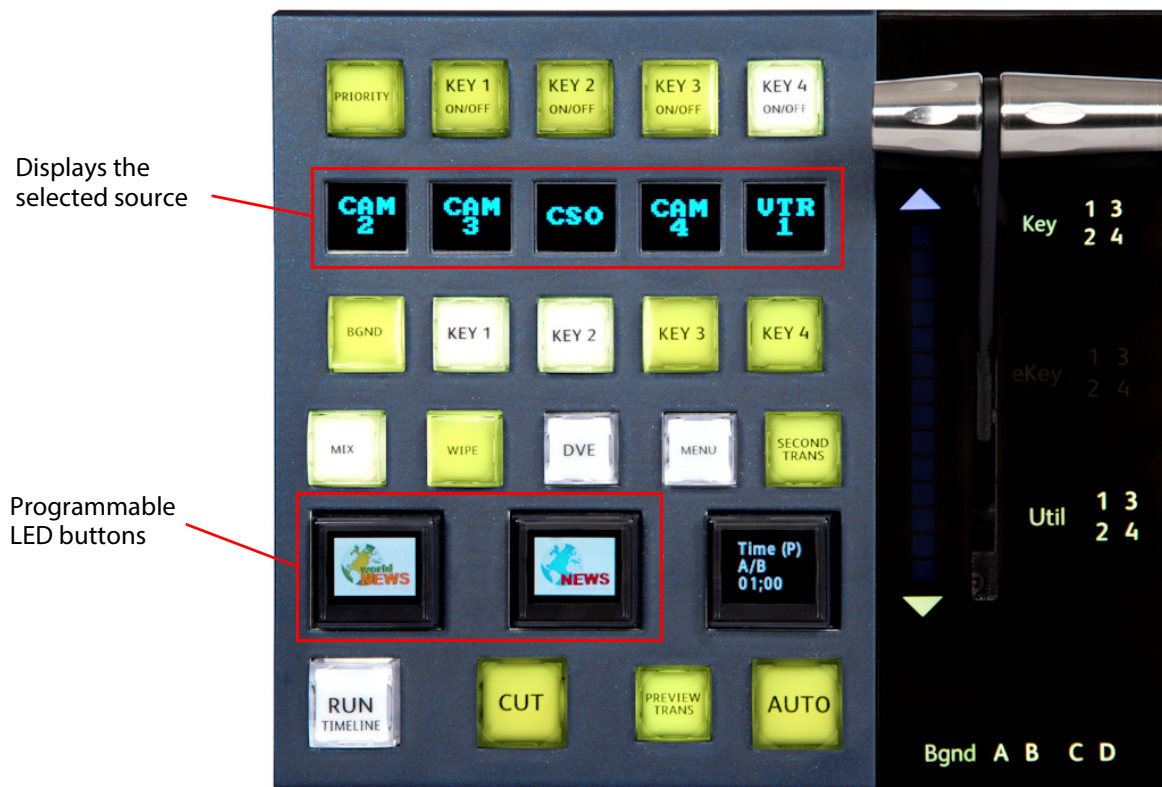
PRIORITY
Enables a priority transition. Also enables the key control pad to set/indicate the next priority.

KEY 1 to KEY 4 TRANS
These four buttons enable the use of a Key layers' own transition. (Each Key layer can have its own Wipe, Mix and /or DVE transition). Any or all of these buttons can be selected as required. The transition for the selected layer(s) is started by pressing the T-bar, AUTO button or CUT button (see above). This facility allows one or more of the Key layers to be transitioned, using a different transition for each layer, at the same time as the background transition.

BGND, KEY 1 to 4
These five buttons select the layer(s) for the next transition. Any number may be active at any one time. Pressing any one of these buttons will clear all others. Holding one button down and then pressing any others will make all of those selected active

MIX
Selects Mix as the main transition.

WIPE
Selects *Wipe* as the main transition.

DVE
This is a future feature

MENU
This selects and displays the Transition menu on the MAV-GUI

SECOND TRANS
This is for the secondary transition, allowing the user to transition between C/D backgrounds (if the system has an Extreme M/E and the resources are setup).

RUN TIMELINE

This will allow a timeline to run in a transition

CUT

An immediate "Cut" between the Background or Key sources causing bus swap.

PREVIEW TRANS

Allows the next transition to be previewed on the preview monitor without affecting the program output.

AUTO

Starts an automatic pre-timed transition, using whatever transition types and times have been selected for the layers included in the transition. The transition time for each layer can be different as can any time offsets.

TIME

Allows the time for an auto transition to be set from the number pad and the parameter control.

T-Bar

Performs a manual transition using whatever transition types have been selected for the layers included in the transition.

Transition Menus

When the **[TRANS]** button is pressed the initial default Transition menu appears with the main transition parameters active, this will allow the user to make basic adjustments to a background or Key transition. The top of the menu indicates which M/E or Key the transition or wipe will effect, as shown below.

The initial menu includes Wipe patterns and the functions that will affect a wipe pattern; the menu also has sub menus for mix controls.
To change the background or Key that the transition menu is affecting, use the Delegate buttons on the GUI.

> Note: If eKeys have been setup on the system, press a Key delegate button on the GUI twice (the button will turn orange) and a limited option transition menu will appear for the selected eKey.

When setting a background transition, pressing the **[BGNDA]** and **[BGNDB]** buttons will toggle between Primary and Secondary background transitions.

Main Transition Control

Adjustments in this section of the menu change the profile of the transition as briefly mentioned in the wipe menu structure.
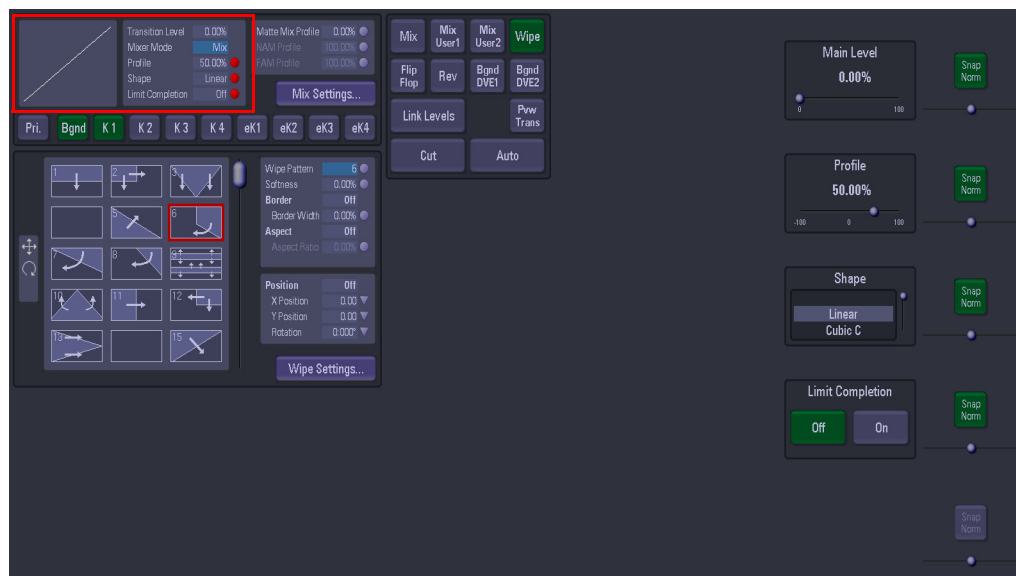
Transition Level - This attacher displays the progress of a wipe as a percentage, useful if a limit is required on a transition.

Mixer Mode - This parameter control determines the type of transition effect.

Profile - This parameter control will adjust the transition curve profile, changing the curve profile will make the transition accelerate or decelerate at a specific moment in the transition period. The curve profile can only be used to change the Cubic S/Sin S and Cubic Curve/Sin Curve profiles, which are selected using the in the Shape parameter control. The Linear profile cannot be adjusted.

Shape - Selecting one of the Shape options will depict the type of profile curve; this will alter the acceleration rate for a transition.

- **Linear** - constant transition, no change in transition acceleration
- **Cubic C and Sin C** - these profiles are similar to each other, the default transition will have a fast acceleration at the start and slowdown towards the end.
- **Cubic S and Sin S** - these profiles are also similar to each other, the default transition will accelerate at the start slow down towards the mid point and accelerate again.

Shapes Parameters
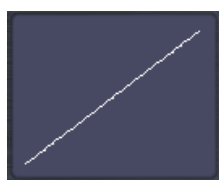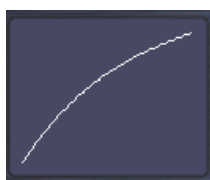
| Linear | Cubic C | Cubic S | Sine C | Sine S |
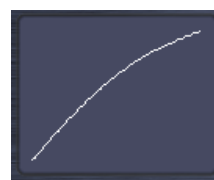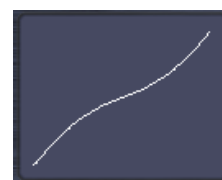
Transition Control - The Pri, Bgnd and K1 to K4 and eK1 to eK4 buttons are used to select or de-select the Transition Control buttons on the control panel.

Profiles and Mix Settings

The **Profiles** menu changes the type of mix fading between two sources in a transition. Touch the Mix attacher box and three parameter controls appear on the right, these are Matte Mix Profile, NAM Profile and FAM profile.
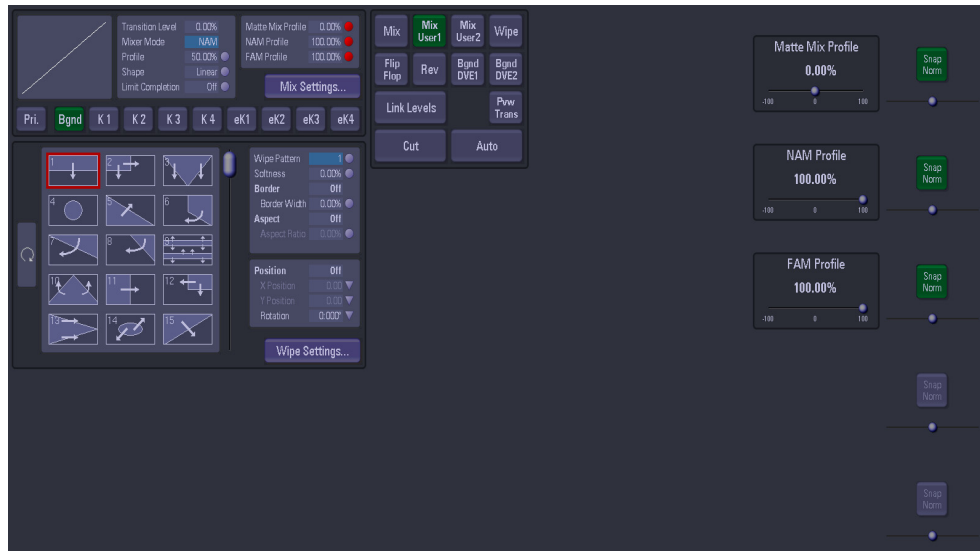
Matte Mix Profile - The Matte Mix Profile is where the output passes through the Matte mix color between the two transition sources, this will cause the transition to go from the first source through a selected matte color to the second source.

NAM Profile - Non-Additive Mix profile, this is where the brighter parts of either source are more prominent than the darker parts during the transition. Thus the brighter parts of the fading out source are apparent for longer than the darker parts. A normal mix will fade out equally across all brightness levels.

FAM Profile - Full-Additive Mix profile, this is where the luminance parts of each source are added together so that at the mid point through the transition, the luminance of both sources are at 100%.

Mix Settings - User Mix 1&2

Press the **{Mix Settings...}** menu link button to enter the Transition - Mix menu.

To select which type of mix will be used in the transition, first select.

[MIX USER 1] or **[MIX USER2]** using the menu from the **[SHORT CUTS]** menu, and then press the **{Transition Control}** button as shown below.
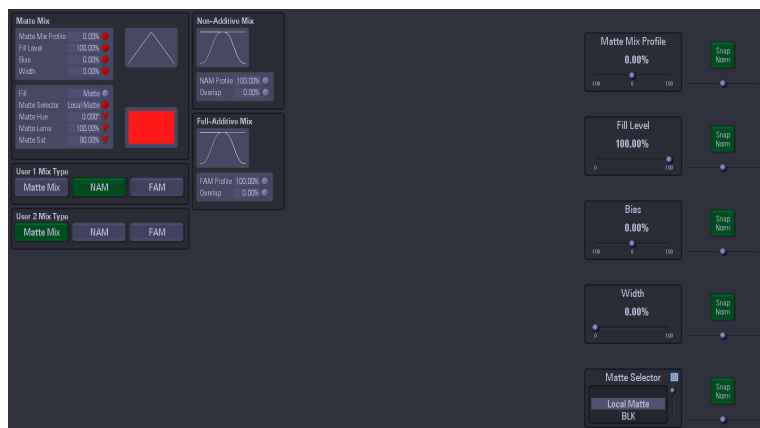
Press the **[SHORT CUTS]** button to access this menu.
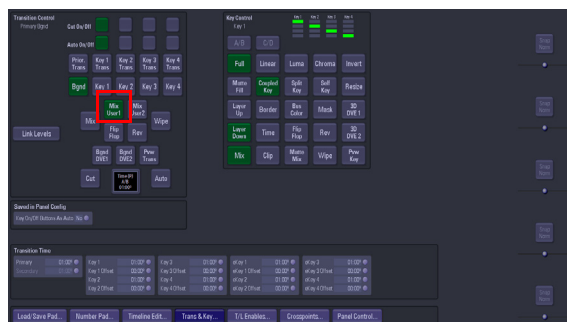
Matte Mix Profile - This is where the output passes through the matte mix color between the two transition sources. This menu sets the amount of matte Fill in the transition.
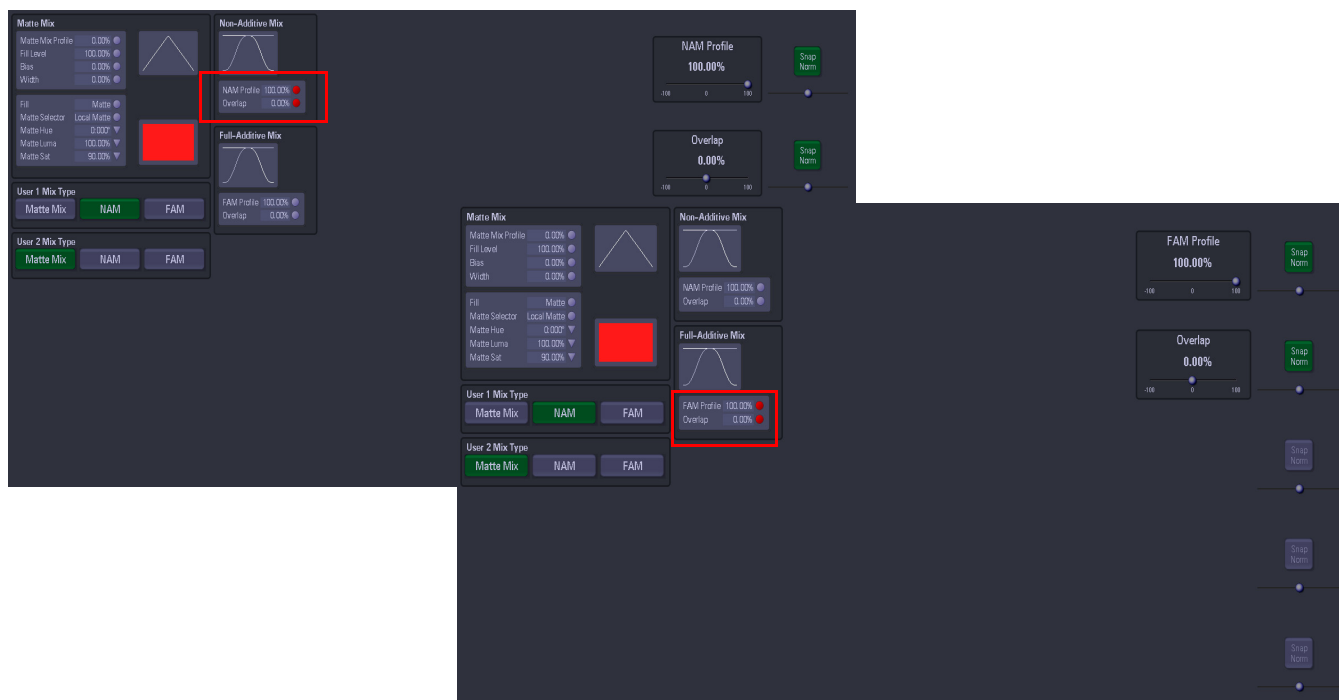
NAM Profile - This is where the brighter parts of either source are more prominent than the darker parts during the transition. Thus the brighter parts of the fading out source are apparent for longer than the darker parts. A normal mix will fade out equally across all brightness levels. The NAM profile control changes the shape of the profile curve where 100% equals maximum amplitude, which produces full Non-Additive Mix, 0.00% produces a normal mix so no NAM and -100% highlights the dark areas in the mix transition.

FAM Profile - Full-Additive Mix profile, this is where the luminance parts of each source (example - background A and B) are added together so that at the mid-point through the transition, the luminance of both sources are at 100%.
After the mid-point of the transition Background B becomes the dominant source and the luminance of Background A goes to 0%.

User 1/2 Mix Type - These buttons select the type of mix that is applied to the **[MIX USER 1]** or **[MIX USER 2]** buttons
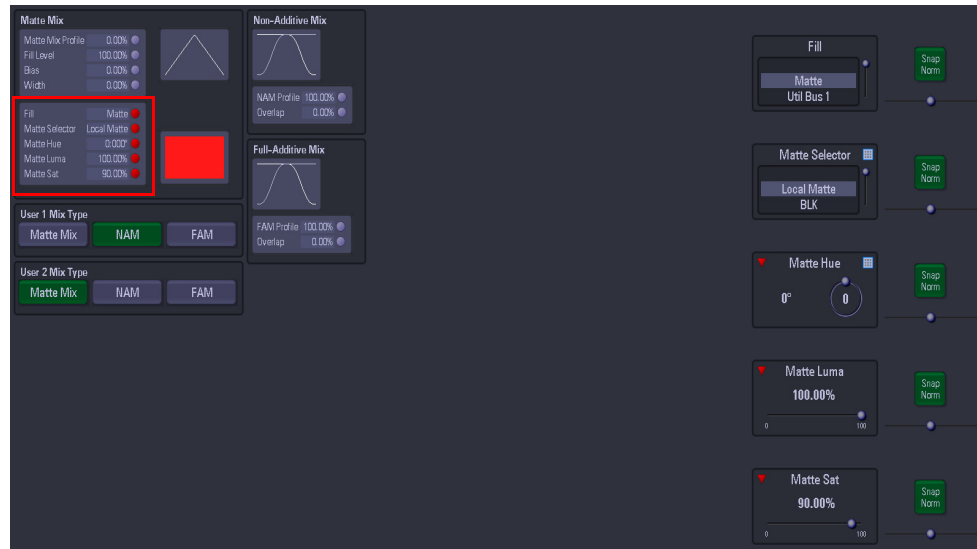
Fill - This function selects the type of source that will be used as a Matte, the options range from Matte, Util Bus 1 and 2. The Util Bus Fill is setup in the Util Bus menu, press the [UTIL BUS] button on the GUI to see which crosspoint the Util Bus's are set to reference.

Matte Selector - Select the required Matte from the options Local Matte or MAT 1 to MAT 16. Hue, Luma and Saturation will only affect the Local Matte setting.

Matte Hue - sets the actual Matte color, the parameter control operates a 360 degree color wheel where:

> 0 = Red
>
> 60 = Yellow
>
> 120 = Green
>
> 180 = Cyan
>
> 240 = Blue
>
> 300 = Magenta

Matte Luma - The Luminance or brightness control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no luminance or Black and 100% is maximum brightness.

Matte Sat -The saturation control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no saturation or no color i.e. only shades of Gray and 100% is fully saturated or maximum color.

Initial Transition Wipe Parameters

This will describe the initial default transition menu functions and parameters.

Wipe Pattern - Adjust to select the required wipe pattern, there are a number of individual wipe patterns available. The number of available wipe patterns will vary depending on whether the background or Key is selected.

Softness - This parameter adjusts the softness of the leading edge or edges of the selected wipe pattern, 0% is the default setting which shows a hard clean edge and 100% blends the edge into the background making it barely visible until the transition is complete.

Border Width - If a border has been selected for example on a square wipe which starts from the center of the screen, the width of the border in relation to the edge of the wipe can be adjusted.

Aspect Ratio - Touch the On/Off button to activate the aspect ration function, as the name suggests this function changes the aspect ratio of a wipe pattern, 0 to -100% will change the vertical ratio and 0 to +100% will adjust the horizontal ratio.

> Note: Aspect ratio will only adjust a limited number of the wipe patterns.

When scrolling through the wipe patterns, notice the wipe pattern adjustment indicator box to the left of the wipe menu. When a wipe is selected this box will display parameters that denote how the wipe can be adjusted, touch this box and a set of adjustment parameters will appear on the right of the menu, these are X,Y Position, Rotation and Aspect Ratio, depending on the wipe selected.

Position - Touch any one of the On/Off buttons in the parameter controls, this will set all the buttons to the On position if they are currently off.

X Position Y Position - The wipe start position can be adjusted to start anywhere on-screen by changing the parameters in the X/Y Position attacher box. Touching any of the On/Off buttons will activate all three parameter boxes. Notice that the Red indicators in the parameter boxes are triangles denoting that the parameters can be adjusted using the parameter controls on the GUI or by using the tracker ball or joystick on the control panel.

Rotation - this will rotate the wipe pattern clock-wise or counter clock-wise in increments.

Wipe Settings

Once back in the main Transition menu, press the **{Wipe Settings…}** menu link button to enter the Transition - Wipe menu.
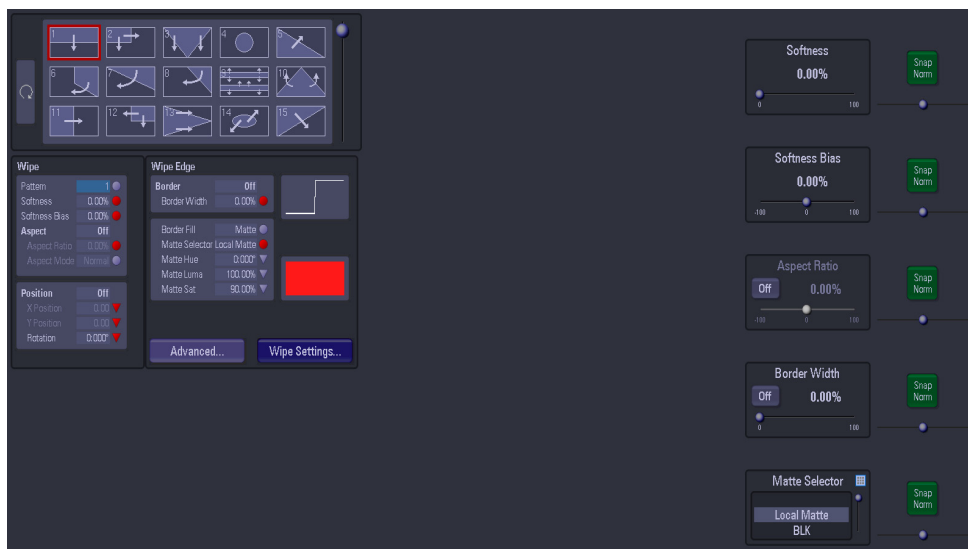
This menu is similar to the main transition menu in functionality, but also allows the setup and adjustment of a border that has been applied to a wipe edge.

> Note: Notice again the Gray box to the left side of the wipe menu. When a wipe is selected this box will display parameters that denote how the wipe can be adjusted, touch this box and a set of adjustment parameters will appear on the right of the menu.

Press the **{On}** button in the **Border Width** parameter to activate the border function.

Border Width - Adjust this parameter to change the border width around a wipe pattern, as the width is adjusted the curve profile shown beside the Wipe Edge title changes. The curve profile will also change when the Softness and Softness Bias are adjusted.
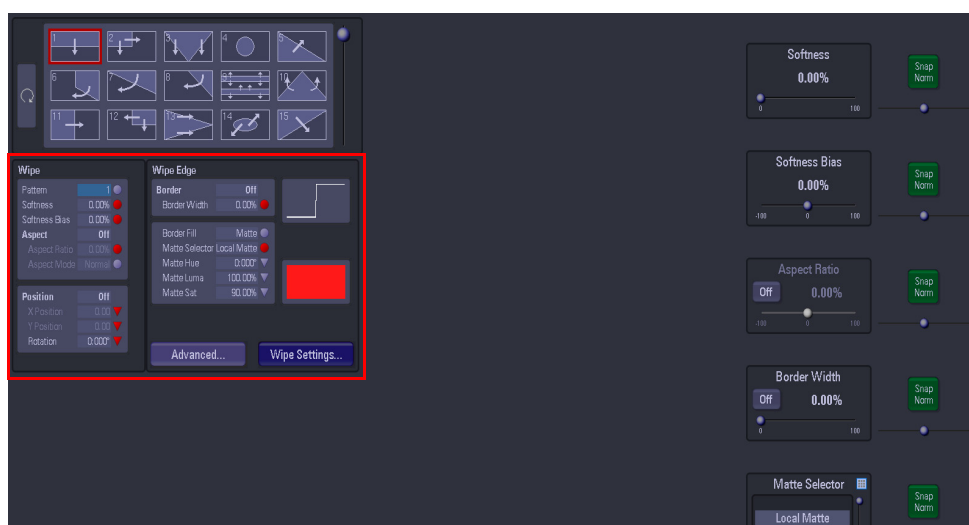
Wipe Attacher

This attacher box allows the selection of a wipe pattern, adjusts the softness of the leading edge of the wipe and adjustment of the aspect ratio of certain wipes. These functions are repeated for ease of use for the user. The only addition is the Softness Bias.

Pattern - the parameter is used to select the required wipe pattern, and also displays the number of the selected pattern in the attacher.

Softness - This function controls the leading edge of a wipe and will add a soft edge transparent edge to the border.

Softness Bias - When a border has been applied to a wipe pattern, this parameter allows the softness adjustment of the inner and outer edges of the border where 100% affects the outer edge, 0% both edges are equally soft and -100% changes the inner edge.

Aspect Ratio control - adjusts the aspect ratio horizontally/vertically of some wipe patterns (will only change the aspect of wipes with the type of adjustment circled in Red, shown left).

Alternate Aspect - widens the aspect horizontally and vertically

Position - control as described in the transition main menu the adjustment of the X and Y Position will enable the wipe start to be positioned anywhere on a monitor screen. The

Rotation - control will allow the wipe to turn in either direction.

Wipe Edge attacher - In this menu the border properties are changes, ensure that the border has been turned on as described at the start of this section.
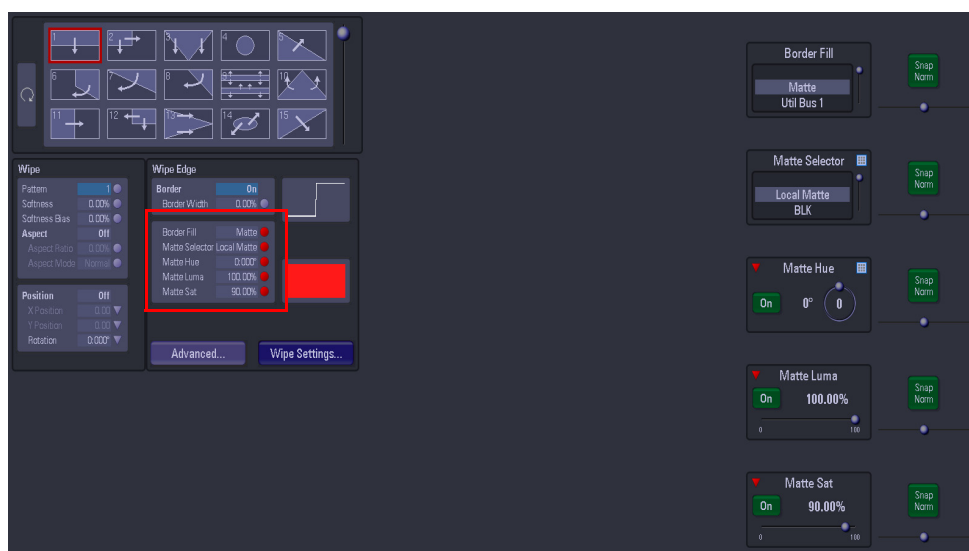
Border Width - This parameter adjusts the width of the border, the default state is set at 0% observe the border and adjust as necessary. A graphical representation is shown in the profile curve box at the top of this menu.

Border Fill - Select the border Fill from either a Matte or one of the four Util Buses, as described in the Mix menu structure.

Matte Selector - Select the required Matte from the options or Local Matte.
Hue, Luma and Saturation will only affect the Local Matte setting.

Matte Hue - sets the actual Matte color, the parameter control operates a 360 degree color wheel where:

0 = Red

60 = Yellow

20 = Green

180 = Cyan

240 = Blue

300 = Magenta

Matte Luma - The Luminance or brightness control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no luminance or Black and 100% is maximum brightness.

Matte Sat - The saturation control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no saturation or no color i.e. only shades of Gray and 100% is fully saturated or maximum color.

Advanced Wipe Settings

The Advanced Wipe settings offer additional wipe patterns that are created by combining the main wipe patterns. For example if a straight edge primary wipe is combined with a secondary circle wipe, the resulting wipe edge will now have a bowed effect, as shown in the example below.

> Note: To use the Advanced Wipe Settings, [BGND A/B] has to selected in the Delegate area of the GUI.

In the Transition - Wipe menu, press the **{Advanced...}** button to access the Transition - Advanced Wipe menu.
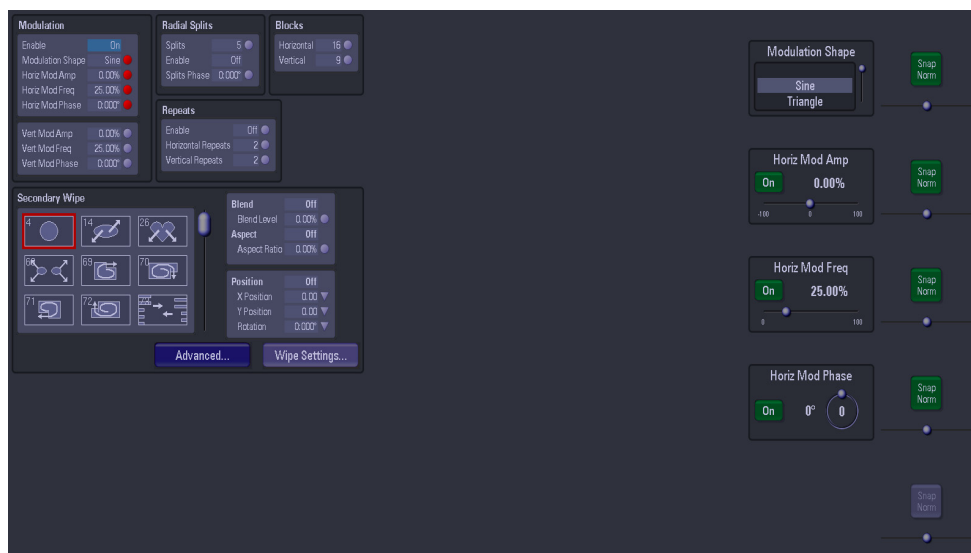
Modulation Parameters

The modulation function enables the user to add different modulation effects to the transition wipe effects.

Enable - enables the modulation option

Modulation Shape - selects the type of modulation effect

Horiz Mod Amp - controls the horizontal amplitude (peak to trough distance) of the modulation

Horiz Mod Freq - controls the horizontal frequency (number of peaks per centimeter) of the modulation

Horiz Mod Phase - controls the start point of the of the modulation and thus the relative position of the peaks and troughs to the horizontal edge of the wipe

Vertical Modulation parameters in principle work in exactly the same way as Horizontal Modulation.

Example of Vertical Modulation

Secondary Wipe

As mentioned at the start of the Advanced Wipe section, the resulting wipe is a combination of two main wipes, the above menu displays the available wipe shapes and the parameters that are used to control the Advanced wipe shape.
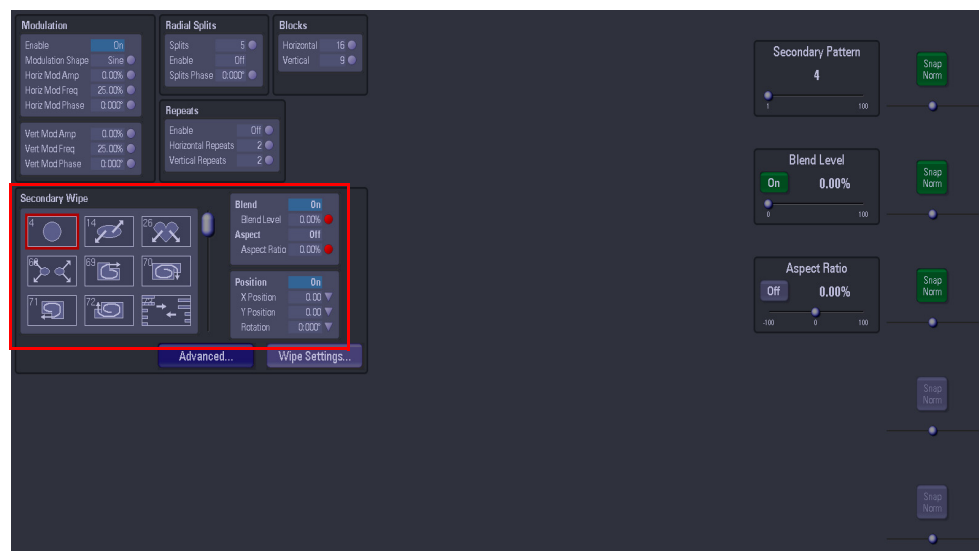
Secondary Wipe Parameters

Blend Level - adjusts the amount of blend between the primary and secondary wipe, 0% means no secondary wipe will be added to the primary wipe, 100% means the wipe shape is made entirely of the secondary wipe shape.

Aspect Ratio - adjusts the aspect of the secondary wipe, for example, a circle secondary wipe will become elliptical when the Aspect Ratio is adjusted, 0% to -100% will adjust the aspect vertically and 0% to 100% horizontally.

Position - enables or disables all the position parameter adjustments

X Position - adjusts the start position of the wipe pattern horizontally

Y Position - adjusts the start position of the wipe pattern vertically

Rotation - will rotate the wipe pattern counter or clock-wise in increments

Radial Splits

Radial Splits will divide up the area around the advanced wipe shape up to 7 times, using this function combined with the modulation function the user can create some very unusual effects, example shown below.
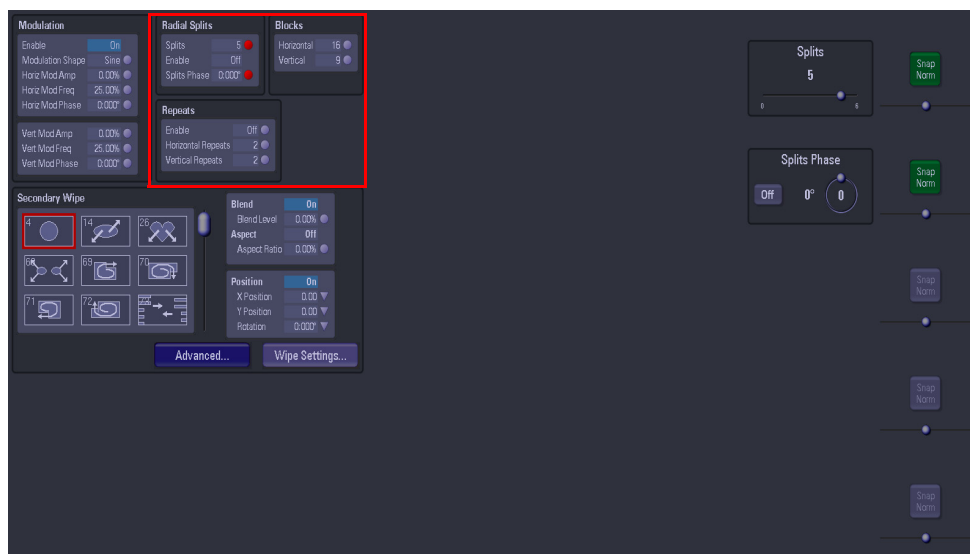
Radial Splits Parameters

Splits - determine how many times the advanced wipe is divided up

Enable - enables the Radial Splits function

Phase - adjusts the phase of the advanced wipe pattern in increments.

Example of Radial Splits

Keying Theory Overview

Keying is the process of inserting a specific part of one video signal (Key signal) into another video signal (background) to create a third signal. The Key signal has two jobs and may be one signal or two. It has to cut a hole into the background and Fill that hole with a picture, or a matte.

Where two signals are used one, the Key cut, cuts the hole in the background and the other, the Key Fill, Fills that hole. The Fill has to be shaped to match the hole.

Where one signal is used it both cuts and Fills the hole. This process of Keying with a single signal is known as a self Key or video Key.

There are three types of Keying available with Kahuna; they are Luma Keying, Linear Keying and Chroma Keying.

Linear Keying

Linear Keying is used where the Key signal is already Keyed, i.e., the area outside the required video is at black level. It is also used where there are separate Key cut and Key Fill signals. The Key signal(s), (cut and Fill) are usually anti-aliased (soft edged) shaped signals created by a character generator or graphics system.

Luma Keying

Luma Keying is a Keying system that is typically used on sources that are not pre-Keyed, such as those from a camera. The Key cut signal is generated from the video signal using lift and gain controls. The portions of the signal that is lower in luminance than the lift level cut the hole in the Key layer.

The Key lift and gain levels are user adjustable.

The Fill may be the same source as the cut or from a different source, or matte generator. When only one source is used for both Key Fill and Key cut the Key is called a Self Key or a Video Key. Super Key.

Chroma Keying

In chroma keying the Key cut signal is derived from color rather than level. A particular color of a picture is keyed away to the background leaving the other colors visible over the background. The transparent color is user selectable and may be a range of colors or a single color. There are various controls to reduce fringing and other artifacts from appearing in the composite picture.

Super Key Layers

Kahuna has 4 Super Key layers per M/E. Their parameters are set-up using the Super Key Control buttons for the applicable M/E. The required Super Key layer is selected from the four buttons at the bottom of the button group, Super Key 1 to Super Key 4.

These buttons are mutually exclusive; they latch and illuminate to indicate which Super Key layer is being worked on.

Each Super Key layer is independent and may have a totally different set-up.

eKeys

Kahuna has 8 Key layers per M/E made up of 4 SuperKey layers and 4 extra key layers that are called "**eKeys**". Each M/E will have 2 permanent eKeys and 2 eKeys that are derived from Util buses, Background buses or SuperKeys that may not be required for a production.

eKeys

Accessing Super Keys and eKeys.

The Kahuna has the ability to have 12 Key layers which are 4 Super Key and 4 eKeys and 4 Dual Tile Key layers derived from the 4 Super Key layers (explained later in this section) on each M/E bank. Keys and eKeys are accessed via one of the delegate MAV modules (MAV-8Xpt-Del-OB/FS).
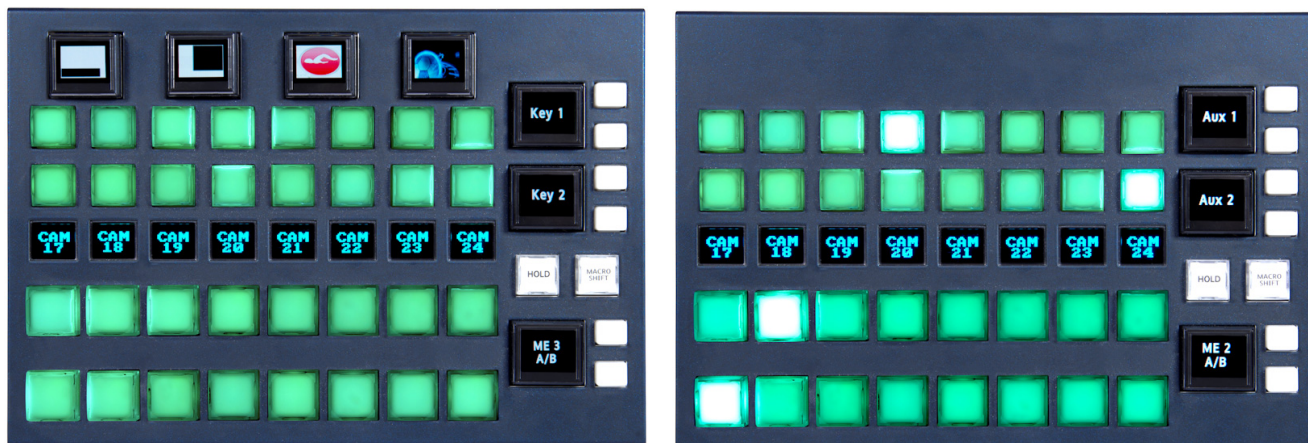
Selecting one of the Keys or eKeys is a simple process, use the Up/Down buttons next to the OLED button to scroll through the options and then press the OLED button to make the confirmation.

Scroll Up/Down

Press to make selection
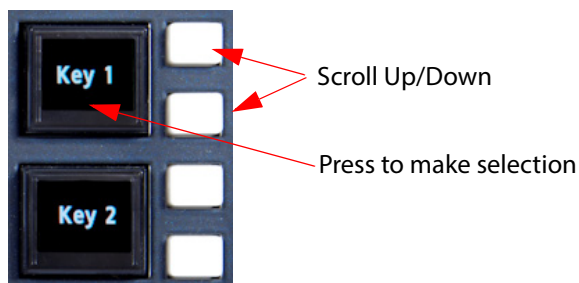
Note: eKey Bus 1 to eKey Bus 4 are only available if the system has been setup correctly in the MakeME^{TM} and eKey - Config menus. Please read the "Connect and Configure" and User Config sections of this manual.

Selecting eKeys 1, 2, 3 and 4 on the Control Surface

There is an optional MAV-DSK module for Kahuna Maverik. When the eKeys have been setup as described on the previous page, eKeys can be selected using the MAV-DSK module.

eKey selection buttons

eKey CUT and AUTO buttons

The Delegate buttons on the GUI allow the user to select which Key(s)/eKeys the current GUI menu is controlling.

As with the control surface buttons, the Key delegate buttons on the soft MLC GUI toggle between the Key represented on the button and eKeys. When an eKey is selected the button will appear green.

eKeys can also be selected on the MAV-KEY-CONTROL module (shown below). Press and hold the [EKEY] button then select an eKey using the [KEY 1] to [KEY 4] buttons. Notice also that when an eKey is selected, the eKey setup menu appears allowing the user to change the settings and parameters of the selected eKey.

Press and hold
[EKEY] button,
then select eKey

Once the eKey configuration has been setup, the eKey Keyer menu can be accessed by pressing the **[KEYER]** button on the GUI. Then touch an **{eKey}** button to select the required eKey. The menu will change to reflect the selected eKey on the GUI.

Buttons used to
select an eKey

Note: Notice the square button between the On/Off buttons. If it is tallied
Red it is contributing to a programme output.

Taking a Key Layer to an Output

This section of the manual will describe how to place a key layer onto a source output. Keys 1 to 4 on an M/E are accessed using the control surface, described in the previous section; the Key Bus buttons on the control surface are used to select the required key and the required source is selected using the Key Bus Crosspoint buttons.

Key source selection Xpt buttons

Key Bus selection buttons

The Key Layers can then be cut to the source output using the Transition Control area of the control surface.

Key On/Off Buttons

Use these buttons to select a Key if you want the Key in a transition.
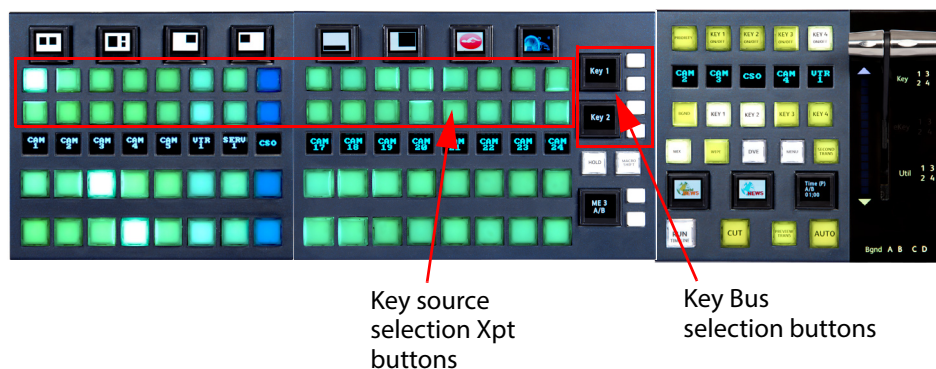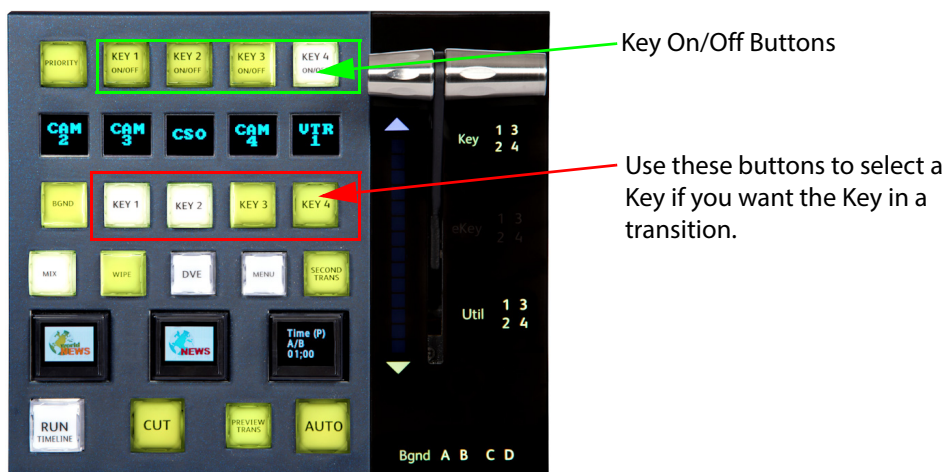
Use the **Key On/Off** buttons shown at the top in the diagram. The buttons toggle On/Off when pressed. With no key layer selected the buttons are unlit, when pressed the button will either light white or tallied red. The key layer can now be seen on the monitor.

> Note: White = off air, Red = tallied on air and contributing to the programme output
> The color of the buttons may vary depending on the user defined button color scheme.

Taking an eKey to an Output

Note: Before setting up eKeys on an M/E output, make sure that the eKeys are allocated to the M/E in the Make ME menu.

eKey bus selection is made in the *User Config - eKey Config* menu where the user is able select the type of bus that the sources for the eKeys can be selected from.
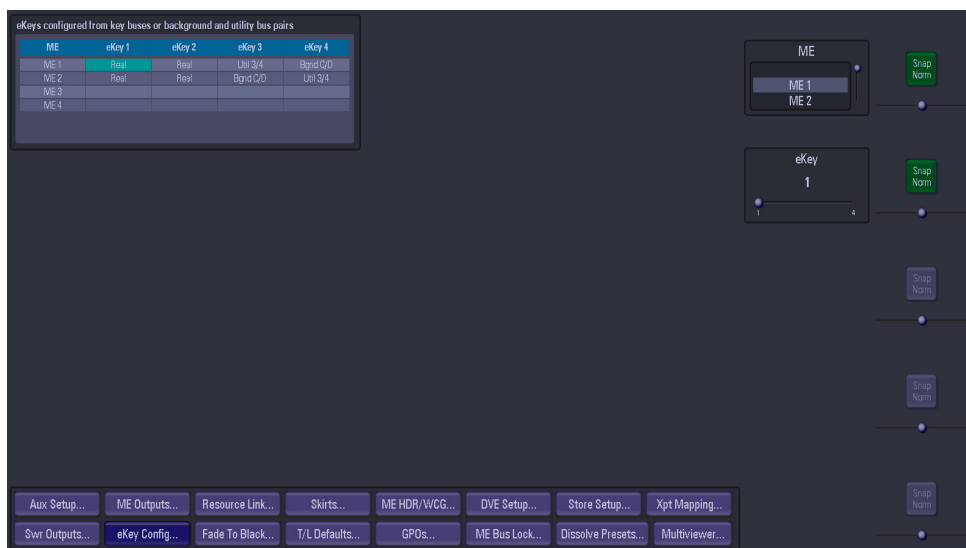
Once the eKey configuration has been setup, the eKey setup menu is accessed by pressing the **[KEYER]** button on the GUI, toggle the required Key button in the Delegate area on the GUI so the button turns Orange and the eKey menu will appear. Select the required source using the Key Xpt buttons on the control surface.

Buttons used to turn the eKey Layer On/Off
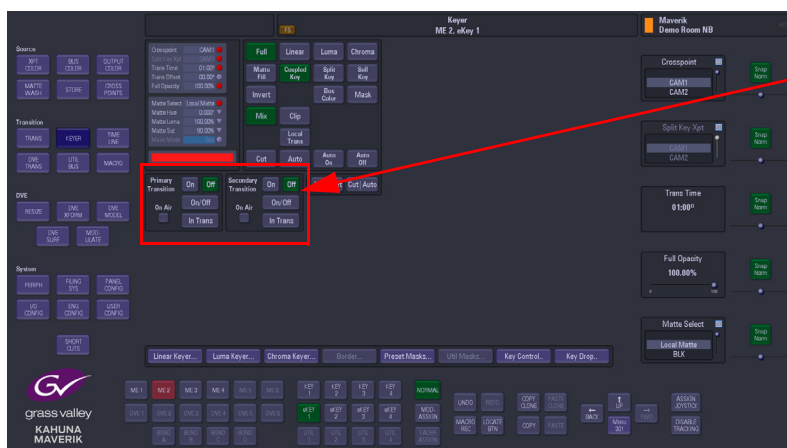
Scroll trough the options elect the required eKey and then press the OLED button to make the selection

Then to take the eKey to an output press either the **{Cut}**, **{Auto}** or **{On}** buttons in the menu. The eKey layer is now contributing the output.

Keying

If your system does not have a MAV-KEYER module, Key Control buttons are also available in the Keyer main menu and by touching the {Key Control} button.
Touch the **[KEYER]** button on the GUI to enter the Keyer menu.

Keyer
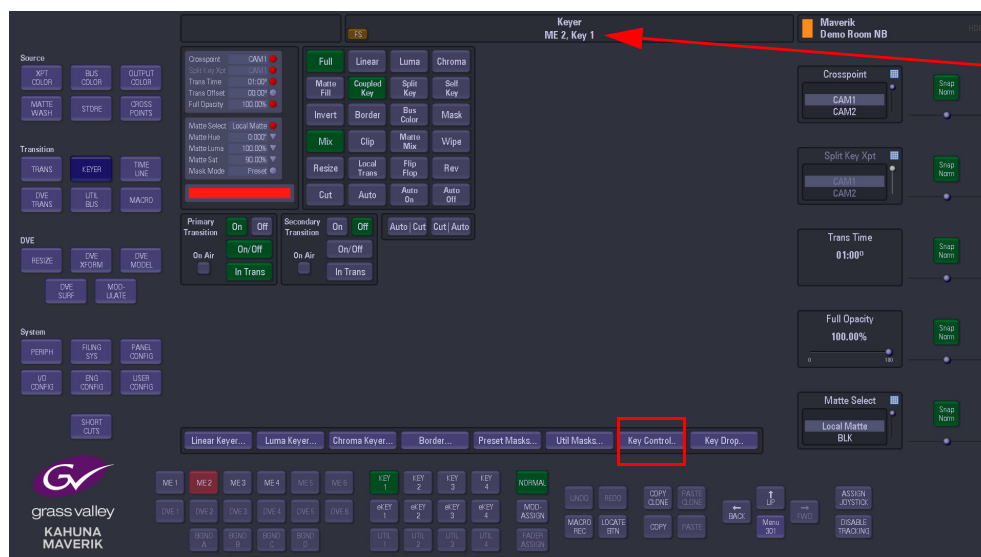
M/E and Key that
the menu will affect
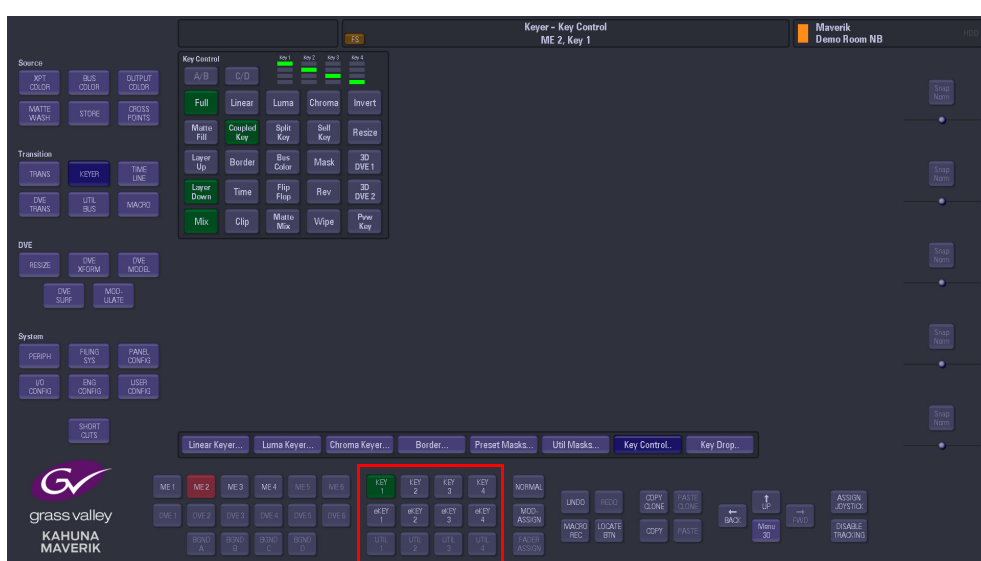
To control the required Key Layer, the same Key Layer button; Key 1 - 4 button, must be selected on and the control panel. If they are different, you will not be able to use the Key Control functions from the GUI unless they have nominated to use 'Key Delegate Tracking' within the Panel Preferences menu.

Note: Menus for eKeys will be described later in this section.

Linear and Luma Keying

The Linear and Luma Keyer menus look similar. They each have independent sets of lift level, gain and opacity controls. The exception being the Shaping parameter in the Luma Keyer
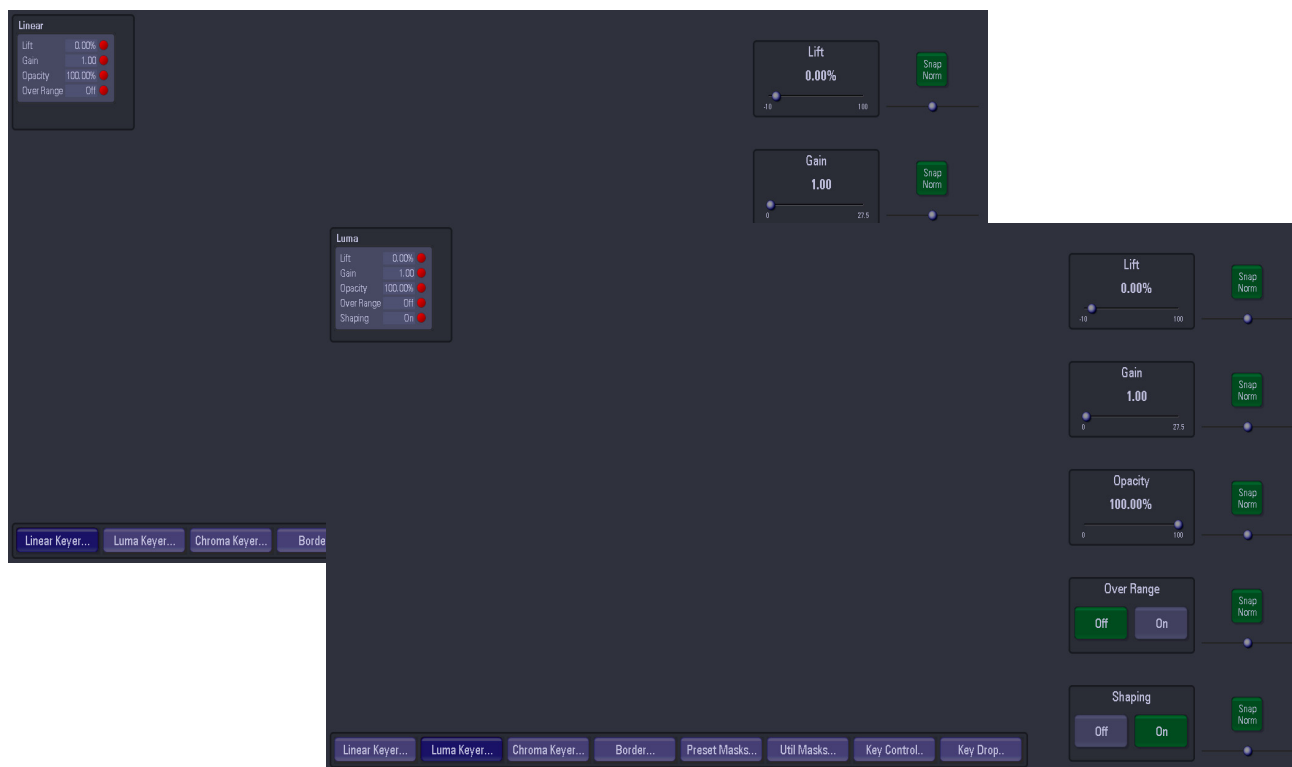
Lift - sets the luma level at which the Key operates.

Gain - affects the sharpness of the lift point.

Opacity - controls how transparent the Key is.

Over Range - Kahuna expects a video range Key of 64 to 940, the video range Key is used internally throughout the system.
If an external CG Key generator is providing a "full range" external Key of 4 to 1019, this would be classed as technically illegal video.
In this situation, the Over Range parameter can be used to bring the full range of a Key back within the video range Key levels.

Shaping - stops dark edges appearing around a Keyed source (anti-aliasing).

When using sources that are not pre-Keyed, such as those from a camera, the Key cut signal is generated from the video signal using lift and gain controls. The portions of the signal that are greater in luminance than the lift level cut the hole in the background.

The Key lift and gain levels are user adjustable. The Fill may be the same source as the Key or from a different source, or matte generator.

> Note: When only one source is used for both Fill and Key, the Key is sometimes called a Self Key or a Video Key.

Preset Masks

Preset Masks allow the Key layer to be masked; they do this by using a pattern to key through to the background layer. There are two Preset Mask options, both are identical in operation and both can be applied to a single key layer.

Each mask has arrows identifying which direction the mask will be adjusted using the parameter level controls.
Use the Pattern parameter to select a mask or by touching the appropriate pattern on the GUI, a red square will appear around the mask.

Notice the box directly below the mask menu. When a mask is selected this box will display parameters that denote how the mask can be adjusted, touch this box and a set of adjustment parameters will appear on the right of the menu.

Kahuna
User Manual

Parameter Controls

Preset Mask - enables the either Preset Mask 1 or 2 On/Off

Invert - inverts the mask leaving the background visible within the preset mask pattern

Mode - select between Exclusive and Inclusive, set to Exclusive unless using a chroma key.

Pattern - scrolls through the masks available

Level - controls the amount of mask wipe

X Position - moves the center of certain masks in the horizontal direction

Y Position - moves the center of certain masks in the vertical direction

Rotation - Rotates certain masks, the rotation parameter displays the rotation in degrees, and the amount of rotations made.

Aspect Ratio - varies the aspect ratio of the mask

Softness - makes the edge of the mask soft

Overall Enable - enables or disables both Preset Masks

Simple Mask - allows the user to select a preset mask, or just use a simple box mask

Util Mask

The Util Masks use the key source of the Util Bus Xpt that is setup in the Util Bus menu. Using the key source of Util1 Xpt, a Util Mask will key the fill source of Key1 over the background.

This acts like a Luma Key and is typically used on sources that are not pre-Keyed. Two Util Masks can be used on one Key layer.

Enable - turns the Util Mask source On and Off

Source - selects the Util Bus from which the key source of the Xpt will be used to create the mask. To change the Xpt of that Util bus, go to the Util Bus menu or select Util1 or 2 near the Trans Control area and the chosen Xpt on the panel.

Lift - sets the luma level at which the key operates

Gain - affects the sharpness of the clip point

Invert - inverts the mask leaving the background visible through the Util Bus Key.
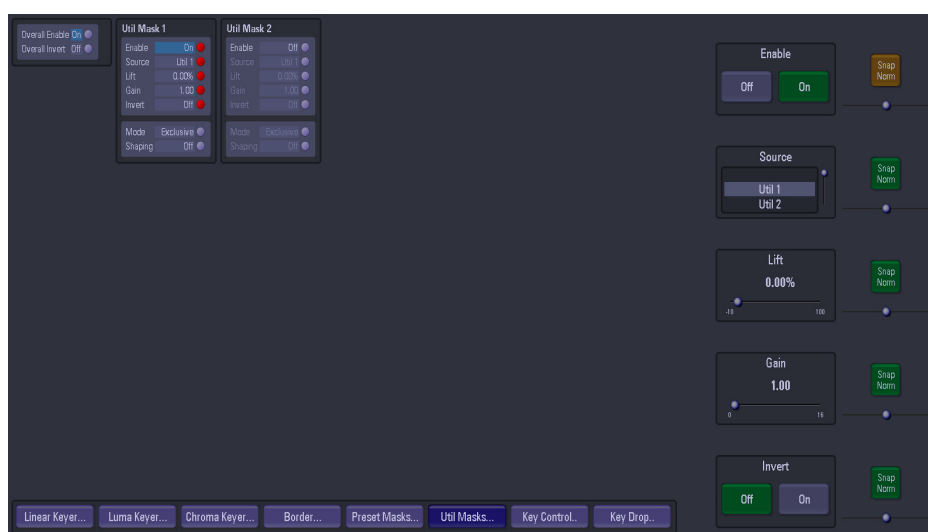
Mode - selects between Inclusive and Exclusive

Shaping - stops dark edges appearing around a key source (anti-aliasing)

Overall Enable - will enable or disable both Util Masks

Preset Mask - Box Mask

Box mask uses a mask shape to mask away the Key layer revealing the Background layer.
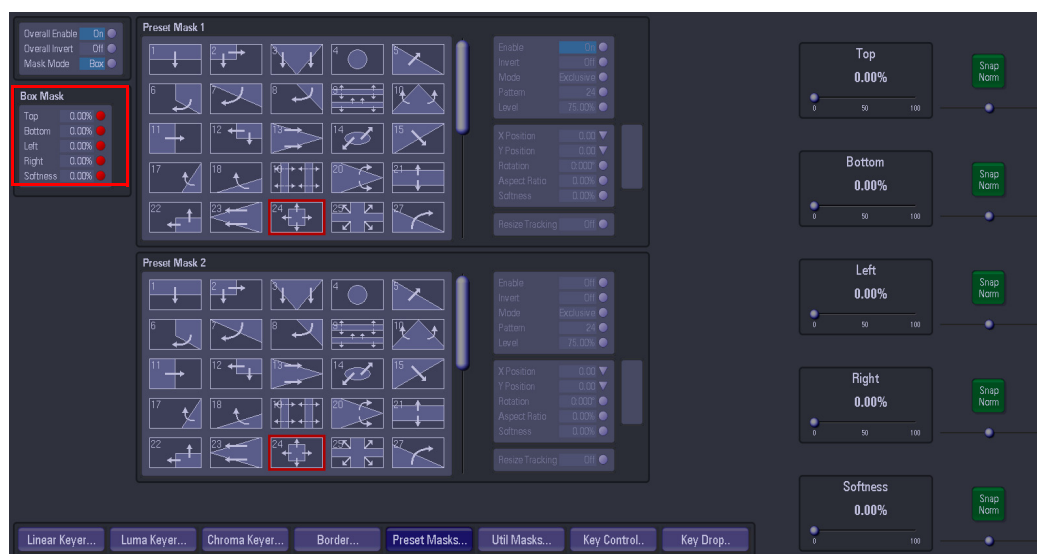
Top, Bottom, Left, Right - using the parameters, this function will mask each side of the Key layer individually, use the On/Off buttons shown in the parameters to switch the Mask On/Off.

Softness - this option softens the outside edge of the Mask

Overall Enable - enables/disables all masks in the Keyer options

Invert - inverts the background through the Key layer

Box Mask Mode - selects between the Preset Masks and the Box Mask

Border

Press the **{Border…}** menu link button to enter the Keyer - Border Generator main menu.

The **Key - Border Generator** menu will add three different types of effect to a Key layer:

Border - will add a border around a Key layer

Extrusion - will add an edge to a single side or two sides of a Key layer

Drop shadow - will add a shadow to the Key layer
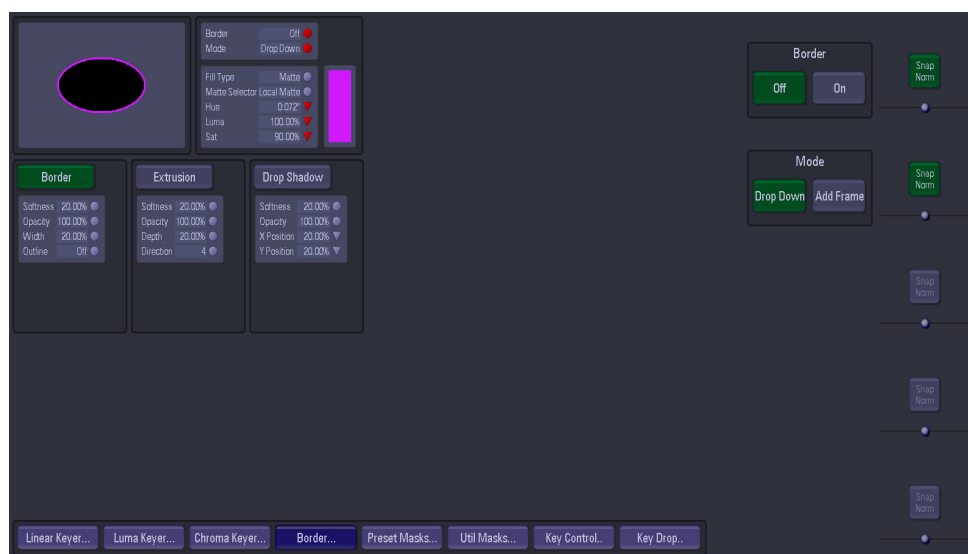
Border

To choose between Border Extrusion or Drop Shadow press the Green button then touch the attacher below to call up the control parameters.

The border menu as stated earlier, will add a border to a key layer, the border fill type is selected using the Fill Type parameter, the fill type can be either a Matte or one of the 2 Util Buses crosspoints available depending on the type of system.

If Matte is selected for the border, use the Matte Selector parameter to select Local Matte or one of the 16 available Mattes, if the local Matte is selected the Hue, Luma and Saturation can be adjusted in this menu.

Parameter Controls - Border

Softness - makes the outside edge of the border softer, the default setting is 20%

Opacity - makes the border change from opaque to transparent softer, the default setting is 100%

Width - changes the width of the border, the default setting is 20%

Outline - When Filled the keyed source is visible, when set to Outline only the Border is visible

Setup Attachers
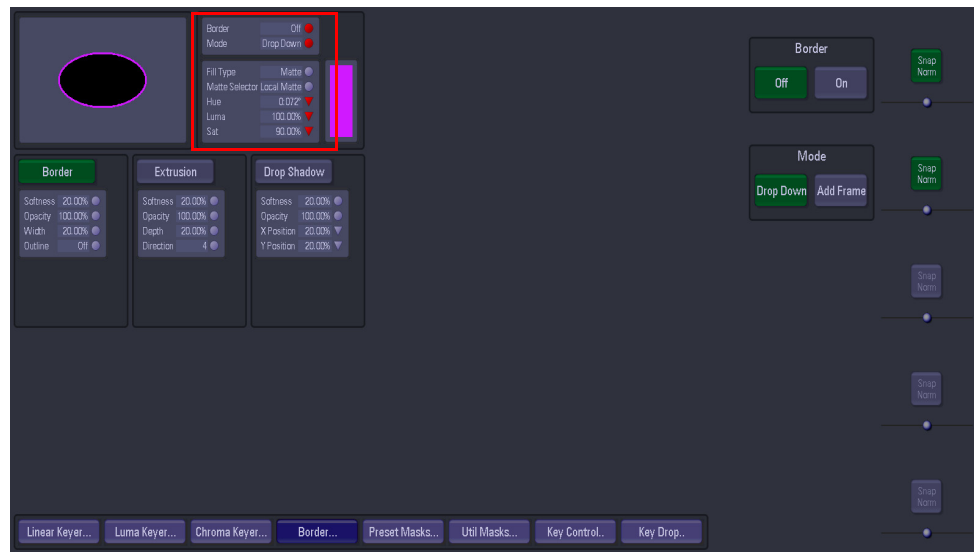
These parameters are the generic for the three different Border Generator effects.

Border - turns the border On or Off

Mode - Drop Down Mode will apply a Border, Extrusion or Drop Shadow to a key layer within 1 field by moving the key source down by the width of the border. Add Frame will maintain the key's position but will add a frame of delay to allow the Border, Extrusion or Drop Shadow to be generated.

Fill Type - selects between Matte and Util Bus, which is used as the border, extrusion or shadow

Matte Selector - selects between Local Matte or Mattes 1 to 16

Hue, Luma Sat - adjusts the color of the Local Matte only

Extrusion

This option will add an extrusion to one side or two sides of a Key layer, and give the illusion that the key layer has a thickness.
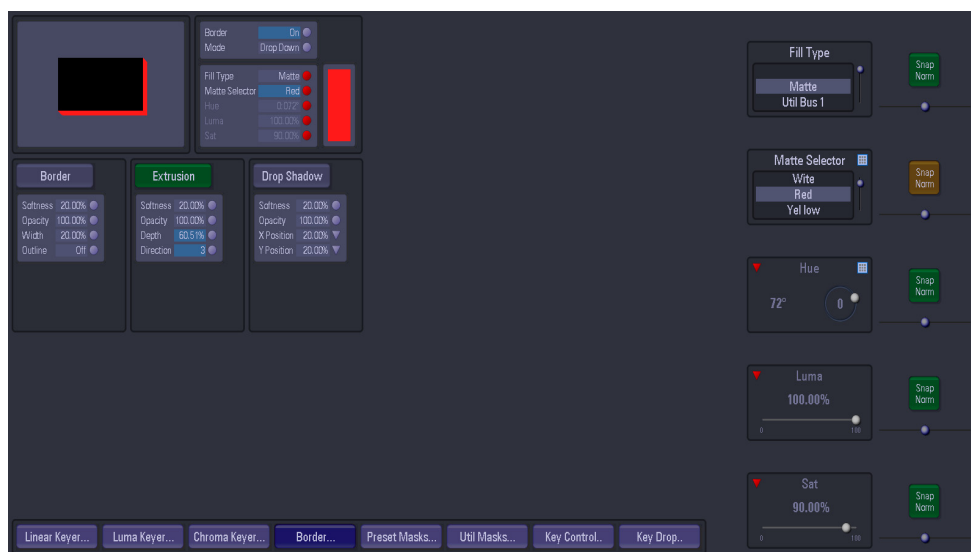
Parameter Controls - Extrusion

Softness - makes the outside edge of the border softer, the default setting is 20%

Opacity - makes the border change from opaque to transparent softer, the default setting is 100%

Depth - exaggerates the extrusion, the default setting is 20%

Direction - moves the extrusion around the edge of the Key layer, the default is set to the bottom edge of the Key layer.

Drop Shadow

This option will add a shadow to the background of the Key layer.
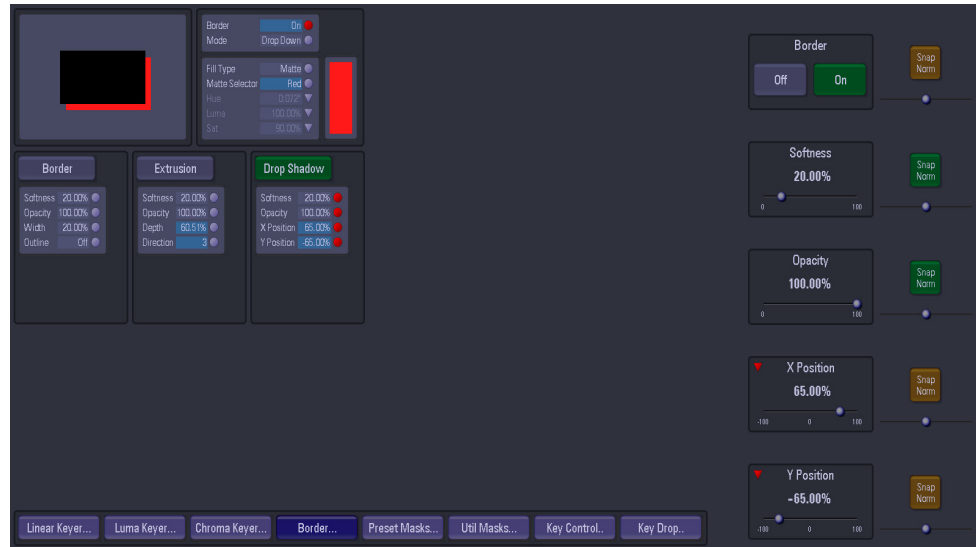
Parameter Controls

Softness - makes the outside edge of the border softer, the default setting is 20%

Opacity - makes the border change from opaque to transparent softer, the default setting is 100%

X Position - moves the shadow horizontally, default setting is 20%

Y Position - moves the shadow vertically, default setting is 20%

Using the Key Control Buttons

Optional MAV-KEY-CONTROL module

Key Priority selection and display

Parameter Control mnemonic displays

Rotary Controls
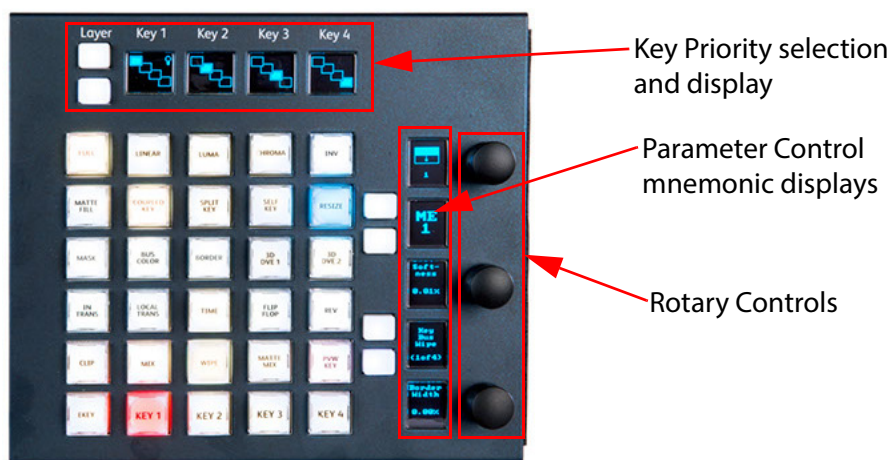
The MAV-KEY CONTROL module is an option when building a Maverik control surface or as an upgrade option. These buttons and parameter controls are used to select and set functions for individually selected Key Layers. When using these functions, it is important to make sure that the Key layers being viewed are the ones that are selected on this Key Control MAV module or else any changes to parameters made here may change the wrong Key Layer.

> Note: Setting the "Menu Tracking" parameter to "Yes" in the Panel Config - GUI Preferences menu, will allow the Soft MLC menus to jump to the relevant menu when some button functions are pressed on the Key Control MAV-module. Double press the Key 1 to 4 buttons for menu tracking.

The type of Keying to be used is selected by the top row of buttons in the Key Control group.

FULL - The Fill is a full layer over the background hiding it completely.

LIN - Selects a linear Key (see ME Keyer chapter; 1st page for full explanation).

LUM - Selects a Luma Key (see ME Keyer chapter; 1st page for full explanation).

CHROM - Selects chroma Key (see ME Keyer chapter; 1st page for full explanation).

INV - Inverts the Key signal so that the parts, which were Keyed off, become Keyed on and vice versa.

MATTE FILL - Causes the Fill to be the Key Matte regardless of whether in Coupled Key, Split Key or Self Key.

COUPLED KEY - Uses the Fill and Key sources allocated to the crosspoint.

SPLIT KEY - By selecting a Key (1 - 4) then holding down the **[SPLIT KEY]** button, the two Key bus selection buttons will display for example "**Key 1 Fill**" on the top Key bus button and "**KEY**

1" on the bottom, the user is also able to see which source crosspoint buttons are selected for the Key/Fill sources, and change the sources if required.

SELF KEY - In Coupled Key mode Self Key causes the Key, as well as the Fill, to be derived from the Fill source allocated to the crosspoint. Also known as a Video Key.
In Split Key mode Video Key causes the Key to be derived from the Fill source of the crosspoint used as the split away.

RESIZE - Selects the resize options X/Y and Zoom position of the selected Key. Stepping Up/Down through the bottom two toggle buttons next to the rotary controls, will display Key Resize menu (2 of 2), where the user is able to use the X/Y Size and H-Flip parameters.
To select the **Resize X Pos, Y Pos** and **Zoom** functions, select the Key (**[KEY1] - [KEY4]**) buttons at the bottom of the module, then press the **[RESIZE]** button. Notice that the mnemonic displays running vertically down the right side of the module display the resize parameters, they can be adjusted using the rotary controls associated with them.

Key Priority Selection

The Key layer priority "**in front**" / "**behind**" position of each of the four Key layers, is displayed by the Key Priority mnemonic displays above the Key Control buttons. The priority of the layers is changed by the Layer Up/Down toggle buttons next to the mnemonic displays, in conjunction with the Key 1 to Key 4 buttons. The Key layers are displayed as a solid square, if a Key layer is "live to air" a light bulb symbol will be displayed in the top right corner if the mnemonic display.

When the **[PRIORITY] Transition Control** button is **On**, the **Key Control Priority** symbols in the mnemonic displays, will display the next Key transition priority and will shown as a "**Box Grid**" instead of a solid box. The Up/Down toggle buttons move the selected "Priority Transition" Key layer up or down one level per press.
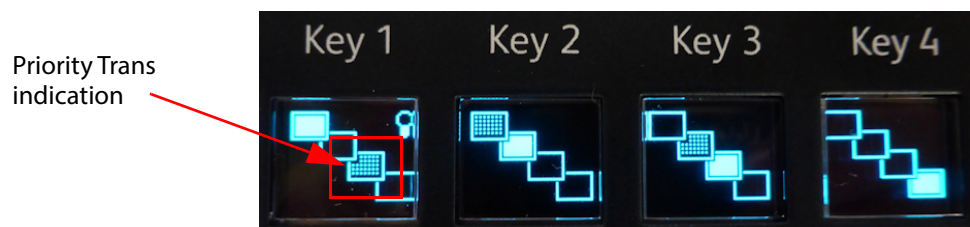
MASK - Enables the Box and Wipe Mask facility. The parameters for the mask are set in the Mask menus which are entered via the top level Keyer menu.

BUS COLOR - Enables the Bus Color Correction which is set-up in the Bus Color menus. Pressing the **[BUS COLOR]** button displays parameters in the mnemonic displays next to the rotary controls. Stepping Up/Down through the bottom two toggle buttons next to the rotary controls, will display Bus Color menus; 2 of 3 and 3 of 3.

BORDER - Selects the Key border facility allowing Border, Extrusion and Drop Shadow to be accessed. Pressing the **[BORDER]** button displays parameters in the mnemonic displays next to the rotary controls

3D DVE1 and 3D DVE2 - Future Feature.

IN TRANS - This button takes the selected Key layer in or out of a transition toggling the state on each press. It is just like using the in/out of transition Key buttons for the Key layers on the Transition Control MAV module. Instead of a dedicated Key for each Key layer as in the Transition Control area, for the Keyer section, the user can select the Key and then press [IN TRANS] button to place the Key layer it in/out of transition.

LOCAL TRANS - Tells the selected Key layer to come out of the main transitions and can be set to make a separate and independent transition instead. For instance, if every Key and background was set-up to make a mix transition, the user is able to select one Key layer to perform a wipe instead by making it a **[LOCAL TRANS]** and selecting a **[WIPE].** Now everything mixes during the transition except for the Key layer that was selected as the [**LOCAL TRANS]** which is now performing a wipe transition.

TIME - Sets the duration of the Auto Key Transition. Pressing the **[TIME]** button displays parameters in the mnemonic displays next to the rotary controls, which include Trans Time and Trans off-set.

FLIP-FLOP - If [FLIP-FLOP] is selected the start point alternates.

REV - If [REV] is selected the start point is reversed.

CLIP - Allows the Key transition to be associated with a selected ClipStore when creating a "Clip Transition". Altering the clip position relative to the transition point, is determined by the **Transition Time** in the **[TIME]** buttons parameters.

MIX - Selects a standard mix (also known as a dissolve or crossfade) as the Key transition.

WIPE - Selects a Wipe as the Key transition. Wipe parameters are displayed in the mnemonic displays next to the rotary controls. The top parameter selects the type of wipe pattern required.

MATTE MIX - Selects a Matte-mix where the source passes through the Matte color before reaching the selected signal.

PVW KEY Previews the **Key** and **Fill** layers individually. Press the button once it will turn pink and display the Key portion of the Key layer, press it a second time and it will light a slightly brighter pink color and display the Fill portion of the Key layer, press it a third time to turn it off.

Working in eKey mode

Working in SuperKey mode

eKey - Press and hold and select on of the **[KEY1]** - **[KEY4]** buttons, selects eKey 1 - 4 (if available).

KEY1 to 4 - Selects the SuperKey layer that will be affected by the Key Control buttons

Short Cuts Menu

This menu is an on-screen GUI Key Control that emulates the Key Control buttons on the control surface.
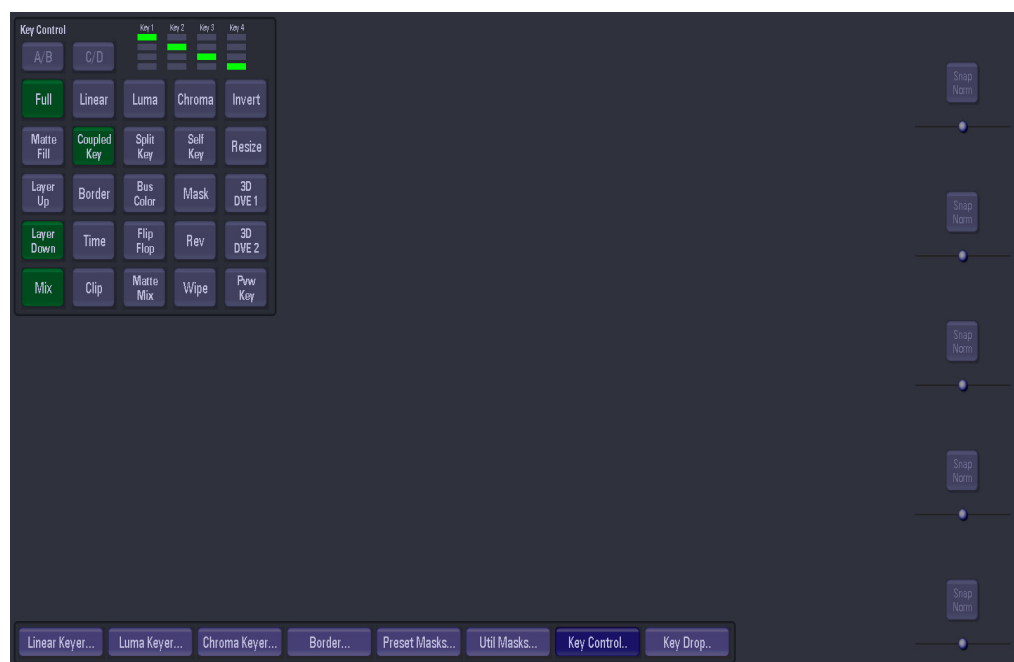
This would be used when for example a Maverik control surface does not have a MAV-KEY-CONTROL module.

Chroma Keying

Chroma Keying Overview

In chroma keying the Key cut signal is derived from color rather than level. A particular color of a picture is keyed away to the background leaving the other colors visible over the background. The transparent color is user selectable and may be a range of colors or a single color. There are various controls to reduce fringing and other artifacts from appearing in the composite picture.

Kahuna has a high quality Chroma Keyer on all SuperKeys and eKeys of each M/E.

Chroma keying can be used in both the Keying of graphics and live pictures. When keying graphics, the set up of the chroma Keyer will be quick and straight forward, this is because the Keyed area is easier to control in a 2D environment.

Keying for a live or moving environments usually more involved and requires additional work as it is more difficult to control color and light.

Achieving good results

The main factor in setting up a good Chroma Key in a live environment is a well lit Key and subject. The Key (usually Blue or Green screen) should be highly saturated and even in tone. The lighting of the subject should highlight whilst aiming to limit the amount of Key color (sometimes resulting in 'spill') reflecting onto the subject. The subject should avoid like colors to the Key color to avoid break-up in the fill. In addition, appropriate and consistent camera setup will be important. The user should also ensure that the Chroma Key is set up for any camera movements and changes in picture.

Using the Chroma Key Menus

To setup the Chroma Key feature quickly and easily, follow the stages listed in the following pages. Before starting to chroma key, ensure that the source material has been loaded into a **Store**, the store has been selected on the required **Key Bus**. Then in the GUI menu, select the **Key Control** menu and select the following buttons:

- The **Key** that has the source material,
- The **{Chroma}** and **{Self Key}** are enabled (for normal keying).

As shown in the diagram below.
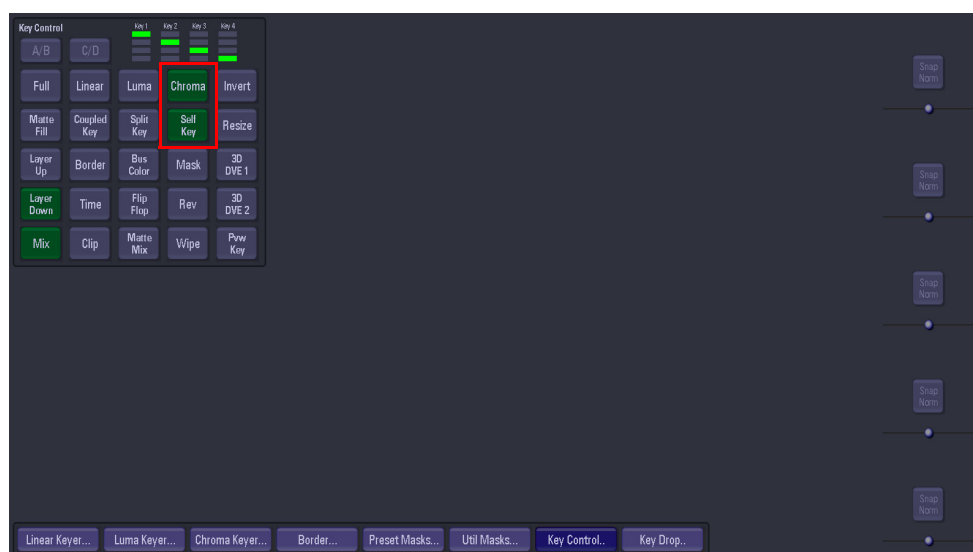
In the Keyer main menu press the **{Chroma Keyer...}** menu link button to enter the Chroma Keyer "**Main**" menu.
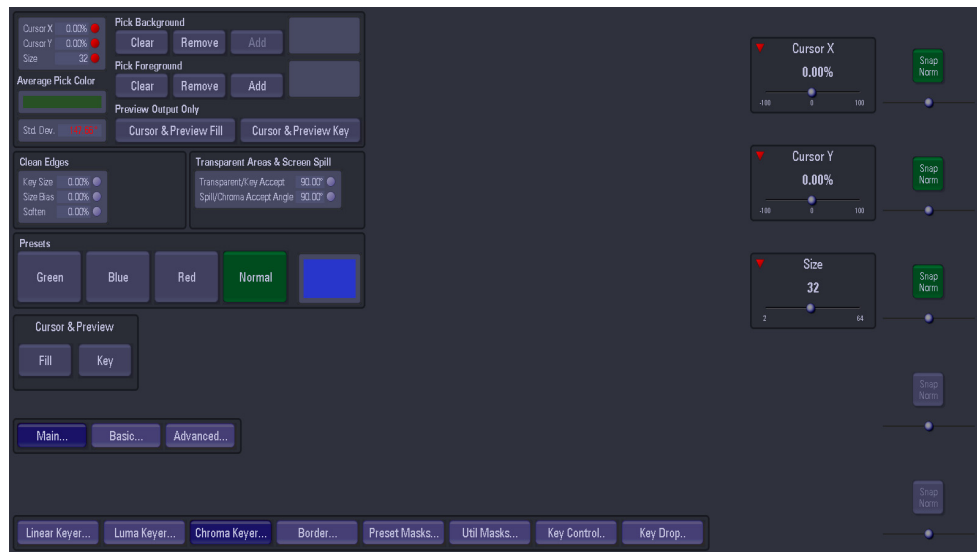
The **Chroma Keyer - Main** menu is the default menu, the chroma Keyer has been designed so that the majority of chroma keying can be accomplished within this menu with just a couple of adjustments. The **Basic** and **Advanced** menus should only need to be used with particularly hard to chroma key source material.

Chroma Keyer - Main Menu

As mentioned earlier, the **Chroma key - Main** menu is designed to tackle a majority of chroma key source material, most of the required adjustments to make a very good chroma key can be made in this menu.
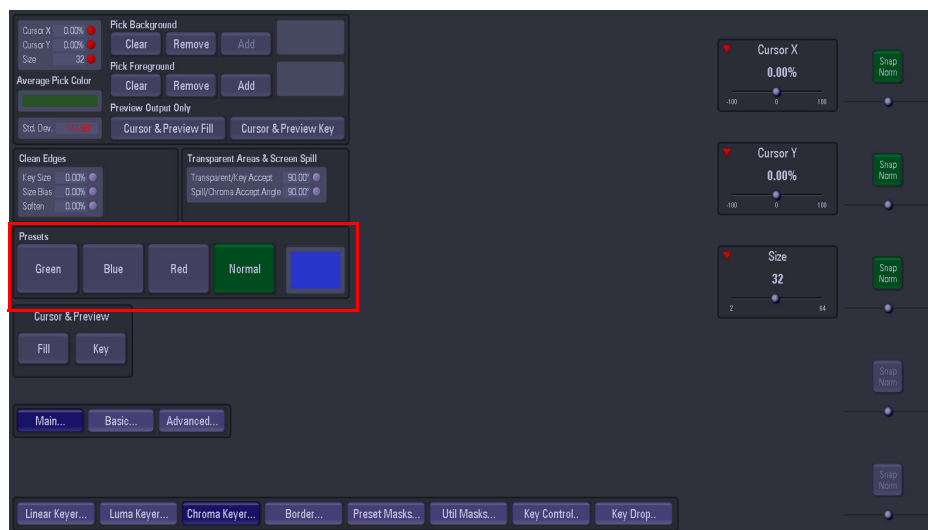
The **Green** and **Blue Preset** buttons are where the user should start to chroma key. The presets will achieve a good chroma key for the majority of good quality source material. The Preset controls have been engineered around a number of different chroma key material, the levels are then averaged out to give a good chroma key across the whole range of material used.

At this stage it is a good idea to work through a couple of chroma key examples; describing the setup and parameter adjustments, and then finally describing all the other parameter controls within the chroma key menu structures.

Example 1

> Note: When starting to setup a chroma key, before making any adjustments, press the **{Normal}** button to normalize all the parameter controls. This is because the current default GMEM may be a user defined default GMEM, not a factory default GMEM.

> Note: Setup the chroma key on the preview (PVW) monitor so that if necessary, the color picker cursor can be displayed.

The chroma key source material used is shown below, this will be keyed over a flower field background.

Press the **{Green}** Presets button and the source material will be chroma keyed over the selected background.
It is as easy as that!
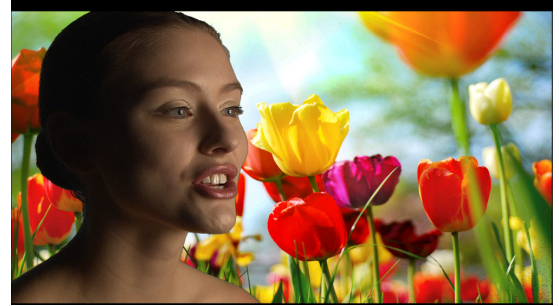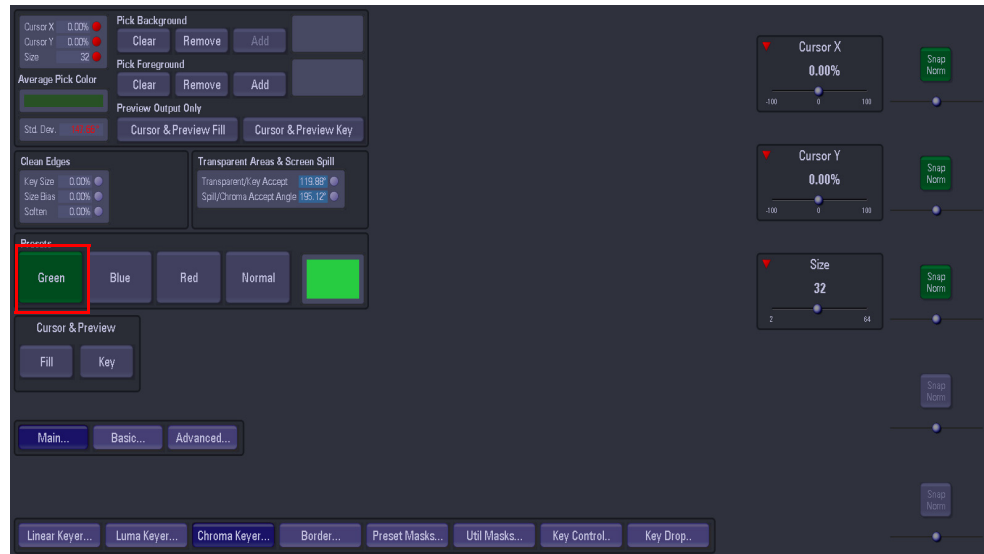
If the subject being chroma keyed has a hard edge (a hard dark/light edge) around it, adjust the **Clean Edge - Key Size** parameter in a negative direction, which will shrink the **Key Size** horizontally in steps as shown in the menu below.
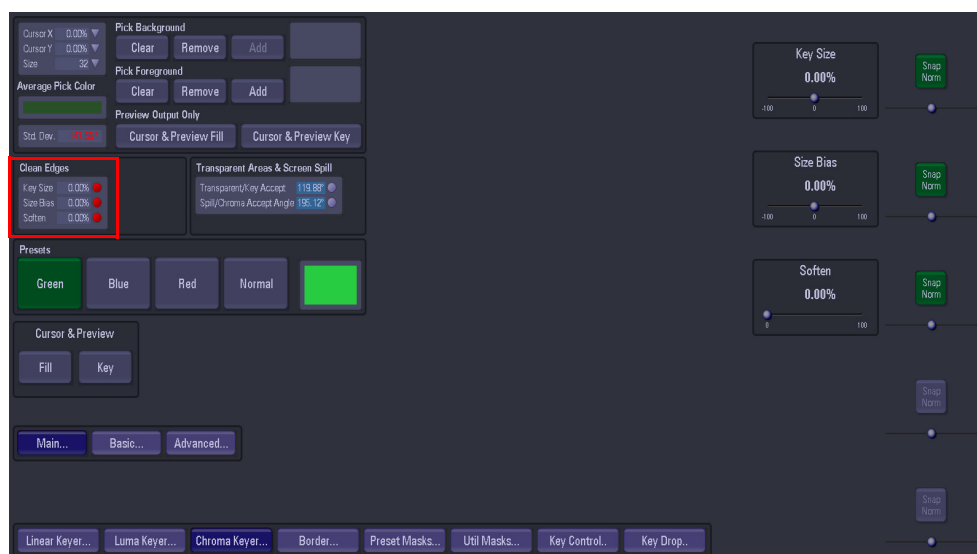
Example 2

If the Presets Green/ Blue did not achieve the desired result, there is a second method to setup the chroma key using the background color picker.
With the source material on the PVW monitor, press the **{Cursor & Preview Fill}** button, this will bring the chroma picker cursor onto the PVW monitor.
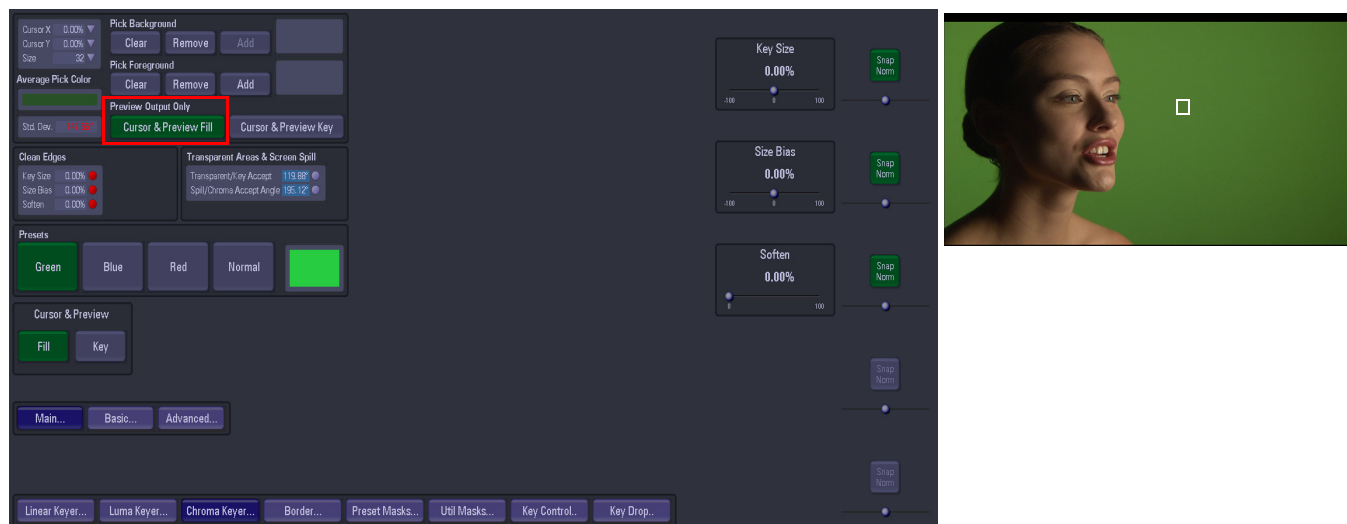
A chroma Keyer will have a control to select the color, hue, needed to generate the Key, this is the **Background/Foreground Color Picker.** The color picker cursor allows the user to take samples of the Background and Foreground, the color picker is used by the chroma Keyer to set the key and chroma acceptance angles. Touch the **Cursor X/Y** attacher and the cursor can be moved around the monitor using the joystick on the control surface, rotating the top of the joystick will increase/decrease the size of the cursor, allowing a greater or narrower sample area to be taken. Select a section of the green screen background that has an even color and press the **Pick Background - {Add}** button to take a background sample.
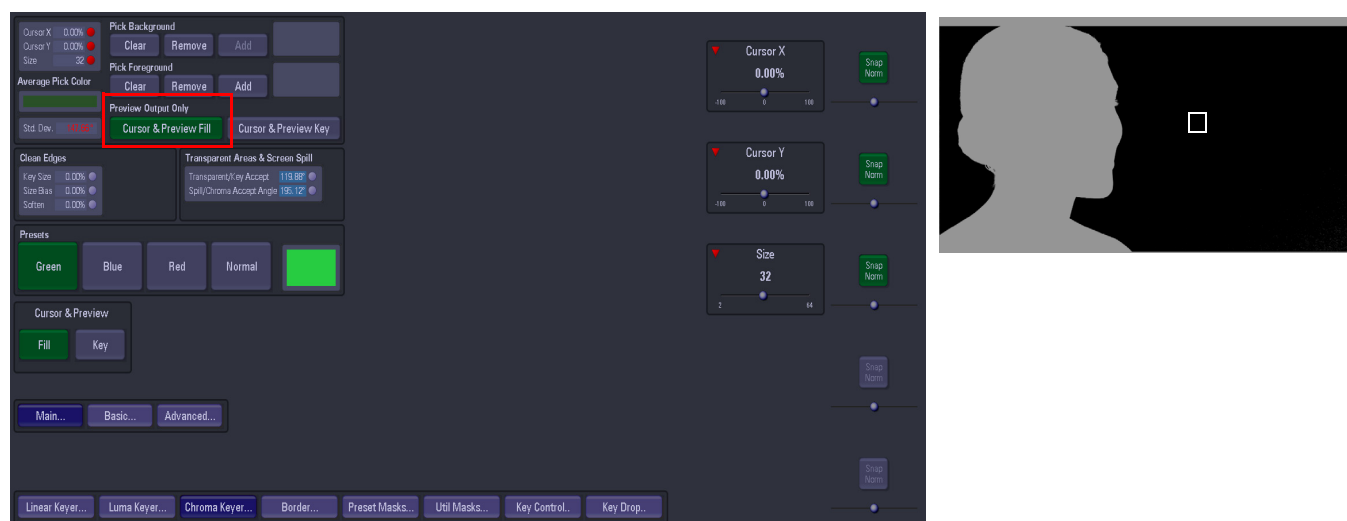
Press the **{Cursor & Preview Key}** button to display the Key signal, if there is any background breaking through into the key signal other than the subject being chroma keyed then move the cursor over the affected area and press the **Pick Background - {Add}** button once again, the key signal will have a clean background.
If the subject being keyed has any breakthrough then a **Foreground Pick** will be needed.
Move the cursor over the affected area and touch the **Pick Foreground {Add}** button.

Press the **{Cursor & Preview Key}** button once again to change from the Key signal to the chroma key source over the background.
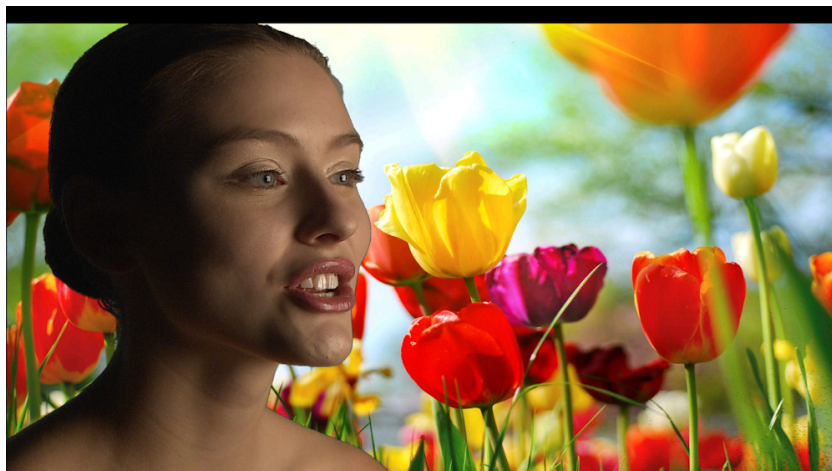
As with example 1, if the subject being chroma keyed has a hard edge (a hard dark/light edge) around it, adjust the **Clean Edge - Key Size** parameter in a negative direction, which will shrink the **Key Size** horizontally in steps.
Only source material that is particularly difficult to chroma key will need further parameter adjustments made on top of what has already been described.

Chroma Keyer Main Menu

The two examples have shown that with just a few adjustments a good chroma key can be achieved. The next step is to describe the menus functionality in more detail.
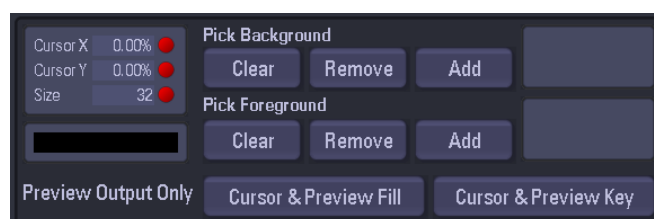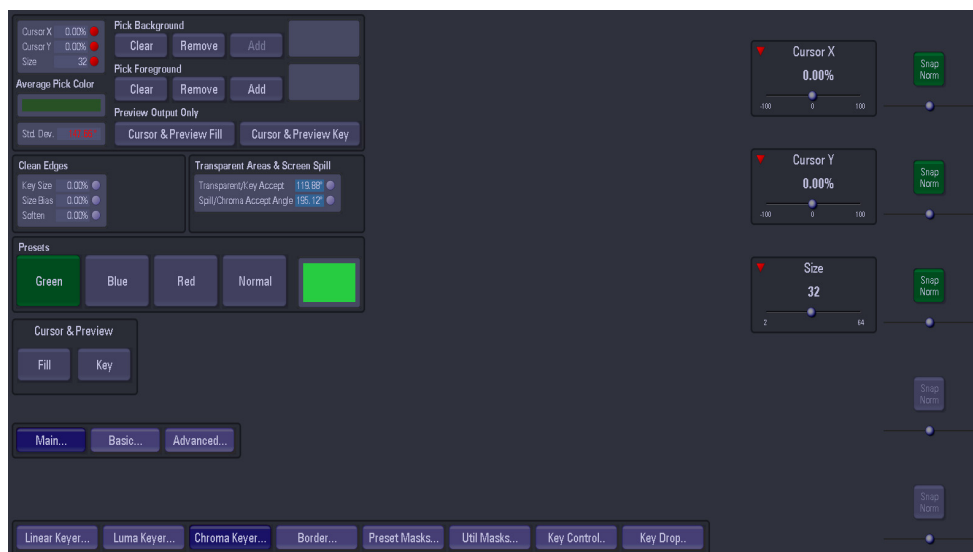
Pick Color - this sets the Hue, Saturation and Luminance automatically, Key and Chroma Acceptance angles will also be set. Allows the user to select areas of the background and foreground to remove any unwanted breakthrough.
Pick Background and Foreground buttons:

- **Add** - will add the selected area inside the cursor to the color picker
- **Remove** - will remove one color pick at a time from the color pick display
- **Clear** - will clear all color picks from the display

Preview Output Only:
Cursor & Preview Fill - with the chroma key source on a preview monitor, pressing this button will display the Fill portion of the chroma key without the selected background.
Cursor & Preview Key - with the chroma key source on a preview monitor, pressing this button will display the Key portion of the chroma key without the selected background.
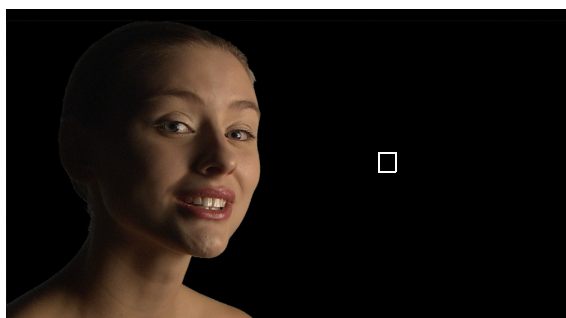
Cursor & Preview Fill

Cursor & Preview Key

485
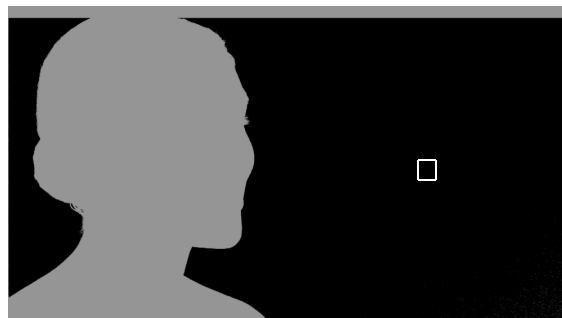
Clean Edges is a key size control, it allows the user to adjust the edge around the material that is being chroma keyed.

Key Size - will shrink or grow the key edge horizontally left or right in steps

Size Bias - this adjusts which side of the key edge is adjusted

Soften - applies a blur to the edge of the key (which edge depends on the Size Bias adjustment).
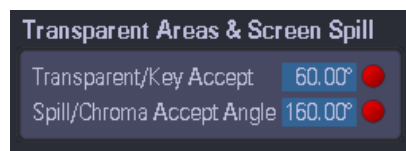
Transparent/Key Acceptance Angle - if opened wide enough allows foreground objects to become transparent. The lower the acceptance angle the less transparent the object being keyed is. In this way Key Acceptance Angle is also a transparency control.

Spill/Chroma Acceptance Angle - if the chroma acceptance angle is set narrow, say 60 degrees, the this will remove the backing color from an object being chroma keyed, but the spill will remain on the foreground object. If the angle is increased to 200 degrees then spill on the foreground object is also removed. If too much angle is applied then the foreground object color is incorrect. In this way Chroma Acceptance Angle is also a spill control.
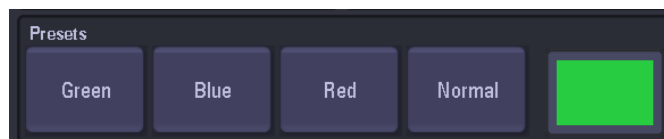
The **Green and Blue Presets** were designed to quickly chroma key good source material where the green or blue backgrounds are a consistent color and the object being chroma keyed has been taken from a good camera source.
The preset levels have been taken from a number of good quality source material clips and stills and will work with the majority of chroma key material.

If the Green preset button is pressed for example, the Key/Chroma Acceptance Angles will always be the same for any material being chroma keyed (Key Accept = 119.88 deg and Chroma Accept = 195.12 deg) as shown in the diagram below.

> Note: If any Background/Foreground color picking is done after using the Presets then the default Acceptance Angles are changed.
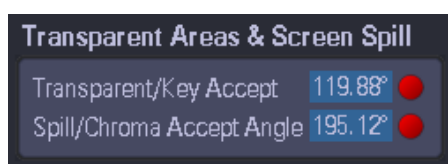
Chroma Keyer Basic Menu

This menu should be used if the source material is particularly hard to chroma key and requires more precise adjustment.
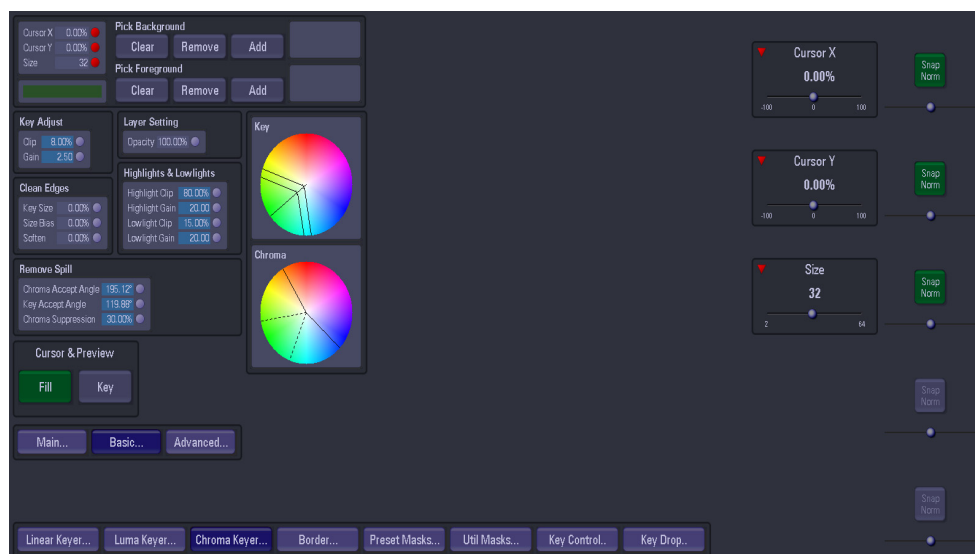
Note: The Background/Foreground Picker and Clean Edges menus have the same functionality as in the "Main" menu.

Clip - sets the overall brightness of the Key Layer. Adjust the Clip parameter to fill in any transparency in the background or foreground image.

Gain - sets the hardness of the edges between the key and the fill, by adjusting the contrast of the key. It can be used to show or mask fine detail at the edges of the foreground. Setting this too high will lead to hard edges to your key.

Chroma Acceptance Angle - this defines what colors (outside of the dotted lines in the Chroma clock) are re-mapped towards the colors along the chroma acceptance angle. It is important that this is at least the width of the Key Acceptance Angle. Adjust this parameter to remove as much of the spill as possible, however opening this too wide will modify the foreground color (as they are remapped).

Key Accept Angle - This sets the angle value of the range of colors to be keyed out. E.g., if it is required to key out green (hue 120) and yellow (hue 60) the Hue control should be set to 90 and the key accept angle to 60, i.e., + & - 30 on the Hue of 90 to give 60 and 120. If this is not set correctly the key window will include not enough or too many colors.

Chroma Suppression - sets the amount suppression applied to the unwanted colors in the keyed signal. The Chroma Suppression needs to be set to minimum value with no color in the background. If the image has areas of transparency or semi transparency, touch the Chroma Suppression attacher and adjust the controls for optimum results to remove any residual background color from the image.
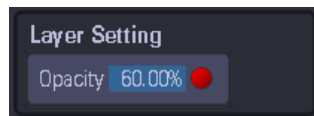
Opacity - this controls the opacity of the Key

The **Clip** and **Gain** control of these parameters adjust the clipping level for the blacks (shadows) area of the signal.

Highlights - reduce the main chroma key in areas of bright foreground luma. This is achieved by subtracting the highlight lift from foreground luma and multiplying that by the highlight gain. Multiply this result by the main chroma key and subtract only the positives to the main chroma key again thereby reducing it.

Lowlights - reduce the main chroma key in areas of dark foreground luma. This is achieved by subtracting the lowlight lift from foreground luma and multiplying that by the lowlight gain. Multiply this result by the main chroma key and add only the negatives to the main chroma key again thereby reducing it.

Chroma Key Advanced Menu

Again, this menu would be used for a more advanced setup of a chroma key.
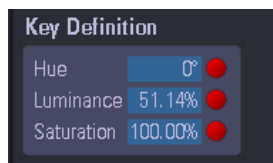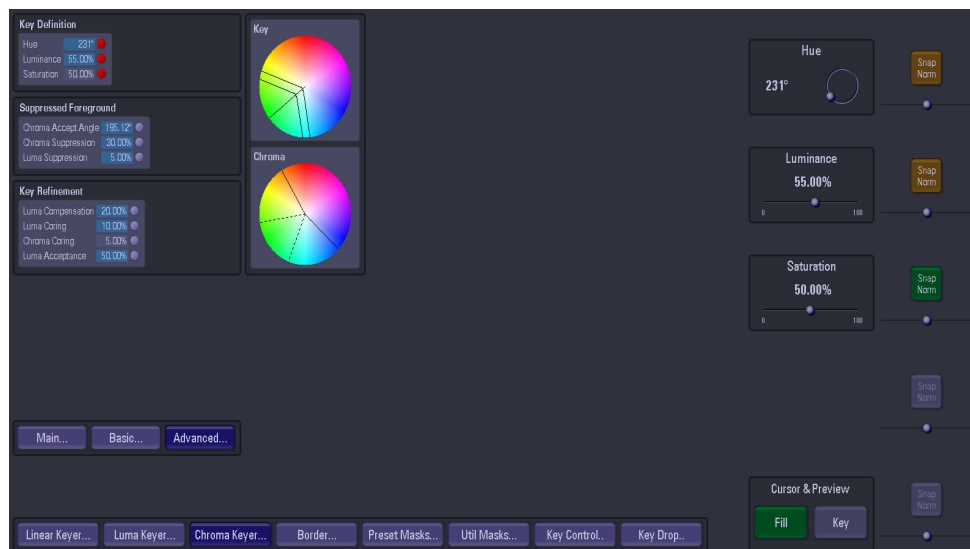
Hue - Selects the color to be made transparent by setting it the appropriate hue angle. If a range of color is required Hue is set to the center value of the range.

Luminance - This sets the luma value of the color to be keyed out. Different

Saturation - This sets the saturation level of the color to be keyed out. If this is not set correctly the colors of the signal showing through the key will not be right.
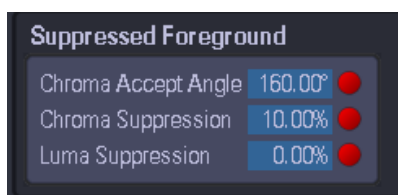
Chroma Acceptance Angle - this defines what colors (outside of the dotted lines in the Chroma clock) are re-mapped towards the colors along the chroma acceptance angle. It is important that this is at least the width of the Key Acceptance Angle. Adjust this parameter to remove as much of the spill as possible, however opening this too wide will modify the foreground color (as they are remapped)

Chroma Suppression - this defines the range of colors (within the dotted lines within the chroma clock) that get suppressed to Gray. The chroma Keyer will de-saturate the spill area to Gray, as it is harder for the eye to recognize compared to a bright Blue or Green halo. Adjust this parameter to reduce the Gray outline and get the best possible results.

Luma Suppression - sets the amount of suppression applied to the luma content of the keyed signal.
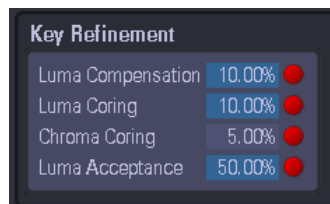
Luma Compensation - is used to adjust the for the level of transparency.

Luma Coring - this adjusts the luma level included in the Key signal by modifying the Key acceptance area in relation to the luminance levels.

Chroma Coring - this adjusts the colors included in the Key signal by modifying the Key acceptance area in relation to the Hue angle.

Utility Bus

Utility Bus Menu Overview

Kahuna has 2 Util Buses per M/E, which equals up to 12 Util Buses in a full 6M/E Kahuna mainframe. Util Buses are used as Borders, Backgrounds and Masks etc.
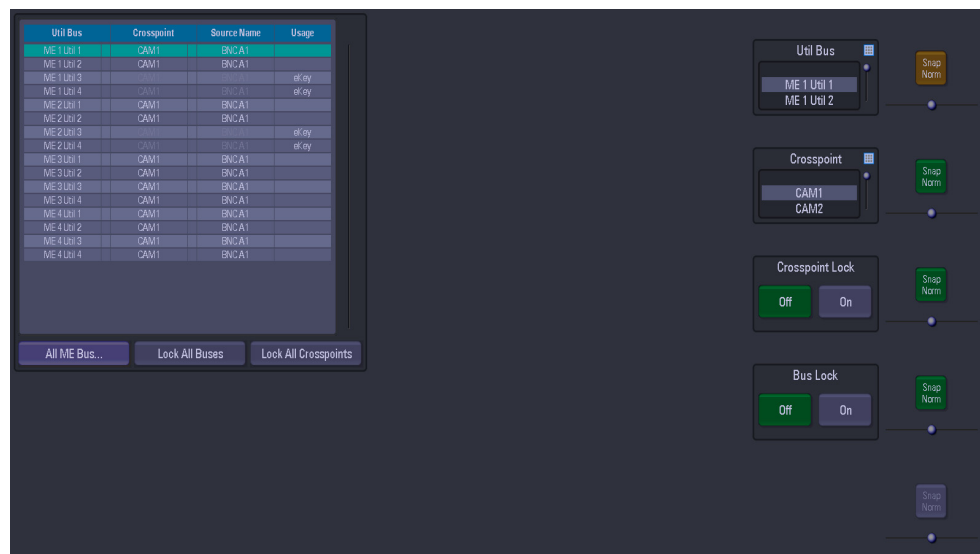
The menu above displays a system with 2 M/E (M/E 1 and M/E 2), the parameter controls associated with the menu are used to set the sources for the Utility Buses.
The table in the menu displays the crosspoint and the source currently selected on the Util Buses.

Crosspoint Lock is used to lock crosspoints on selected utility buses so that the crosspoints and sources cannot be changed. Lock All will lock all crosspoints.

Utility Buses are selected on the Control Surface using the white scroll Up/Down buttons. Scroll down to the required Util and then press the OLED button to select.
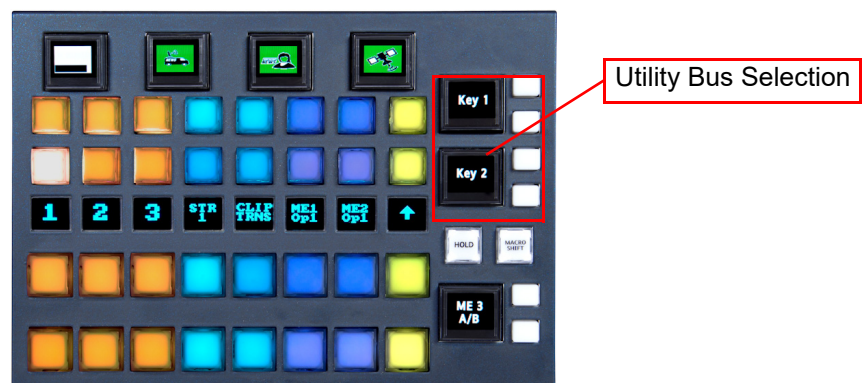
Sources can then be selected using the crosspoint buttons.

Macros Overview

Macros can be assigned to almost any button on the control surface. When macros are assigned to the User Function button on the MAV-UFBPAD or the MAV-AUTO modules they can have an associated "bitmap" added to an OLED display on the programmable User Function Buttons.

Kahuna macros are recorded in real time, this means that macros record functions behind buttons, rather than just the button press. This allows creation of simple multi button operations to complex effects and transitions, which include; Pbus, GPOs, DMEM, and GMEM loading, clip playing and VDCP.

Setting Up Macros
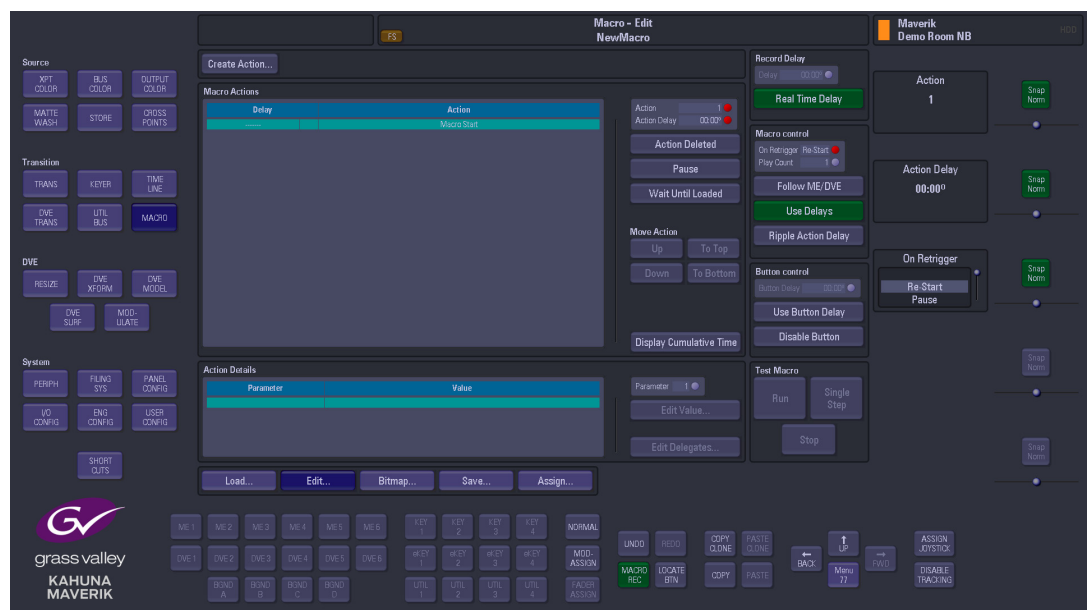
Macros are saved in **Filing System - Macros**, which in-turn are saved into Projects in the **Filing System**. The buttons functions are assigned within the Panel Config. Although the macros themselves are run and activated in the mainframe the buttons are associated with the Panel Config.

As mentioned earlier, macros are recorded as a sequence of button presses in real time, which in turn are translated into a sequence of actions. The delay between these functions (button presses) can be tested and edited once the recording is completed. Once a macro is running if it is run a second time halfway through the macro run sequence, it will instantly start from the beginning.

> Note: A Menu Operation is not recorded as a macro but any direct action within menus will be (e.g. a Pbus trigger).

Macro Record

To start recording a macro press **{MACRO REC}** button on the GUI panel, this button will now go Green indicating a macro is ready to start recording, the macro recording and button delays will only be activated after the first function (button press) has been entered. Once the macro recording has started the **{MACRO REC}** button will go Red. While recording a macro different menus on the GUI can be entered to gain access to any menu-related functions. Once the macro is completed press the **{MACRO REC}** button again and this will end the macro and the button back to an unlit state.

The button press sequence that was recorded in the macro is displayed in the Macro Actions table (shown above). Press the **{Test Macro}** button to test the macro just recorded.

Quick Macro

In the "**Assign**" menu, you can record a "**Quick Macro**" rather than using the normal **{MACRO REC}** button. The resultant macro is no different, but specifically does not 'Follow ME' and does not '**Use Delays**'. More obviously, it facilitates the quick attachment of the macro onto a button without the need to manually save first.
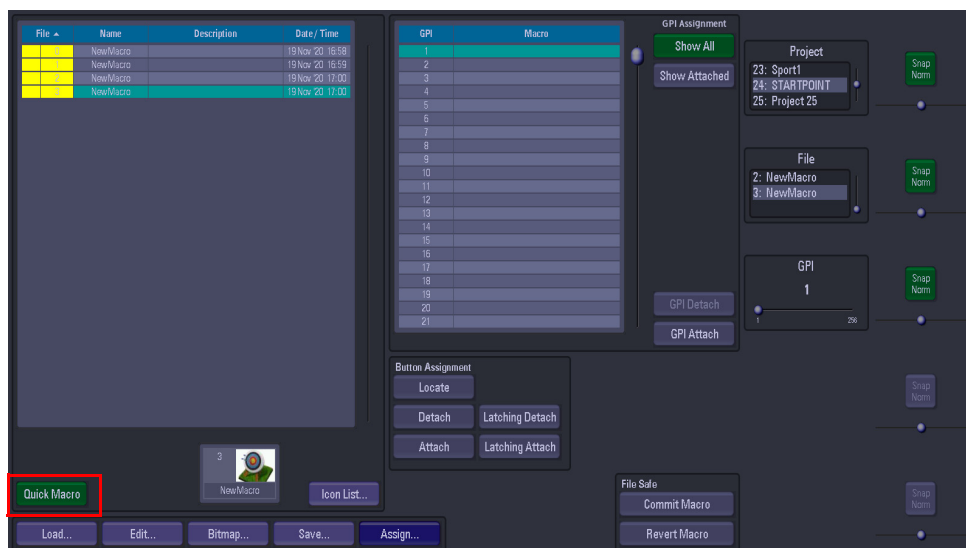
When the macro recording is complete, touch and hold the **{QUICK MACRO}** button. The '**touch**' part will automatically save the macro into an unused slot in the "**Save**" table in the currently selected project, and clear the macro edit buffer.
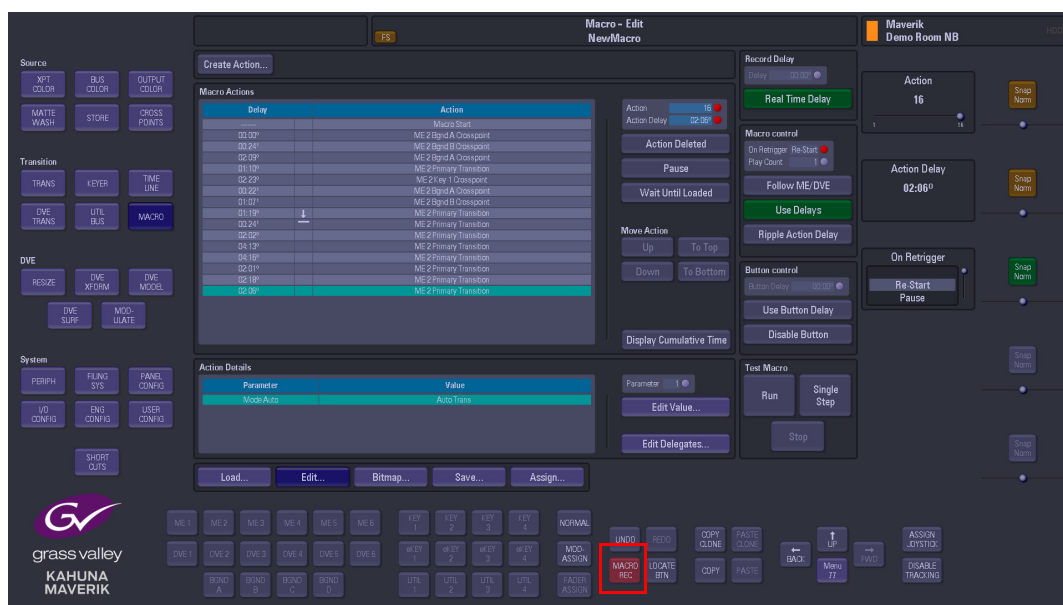
The '**hold**' part will put the panel into "**Save & Button Attach**" mode (if you are currently in the "**Macro - Save**" menu, the **{Save & Button Attach}** button is lit red). Whilst in this state the control surface buttons are lit white and display a pulsating effect. Prior to releasing the **{QUICK MACRO}** button, the target button for the macro attachment should be pressed and released. This will record the attachment and cancel the Button Attach mode. The **{QUICK MACRO}** button can now be released.
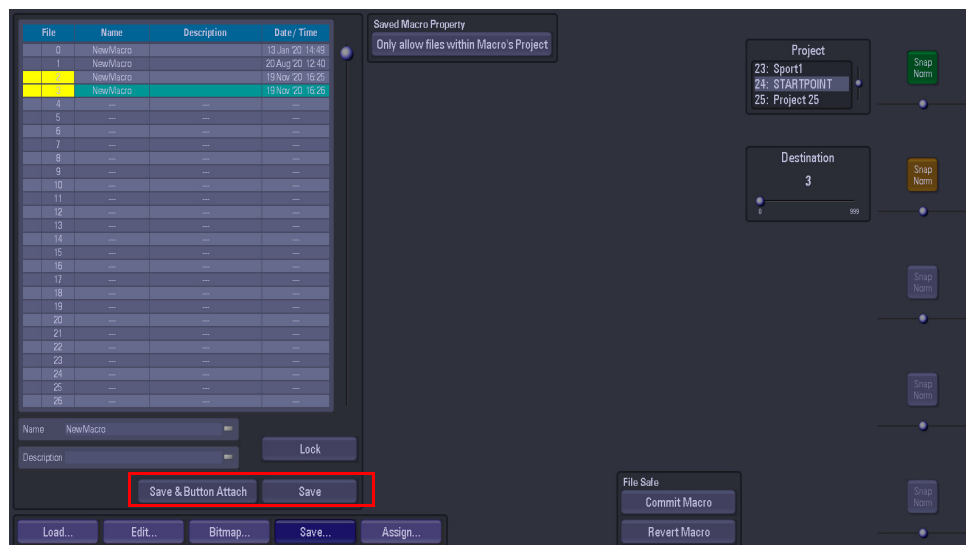
You can still pause during recording by holding down the **{MACRO REC}** button until it changes color. Recording is resumed when either button (regular or 'Quick') is pressed again.

Additional attachments (of the same macro) can be made by pressing and holding the **{QUICK MACRO}** button. This will trigger the attachment stage again.

Pausing a Macro Record Sequence

A Macro can be paused once a record sequence has started, whilst a Macro is being recorded the **{MACRO REC}** button is Red, press and hold the **{MACRO REC}** button and it will turn Orange indicating that it is Paused, at this point the Button Delay timer is also paused. Press the **{MACRO REC}** button once, the button will turn Red and the record process will start once again.

> Note: While a macro is paused, Kahuna can still run multiple other macros at the same time.

Appending more Macro Actions to a Macro Sequence

Additional macro actions can be added to a previously recorded macro sequence, in the **{Edit...}** menu, move the highlight bar to the position above where the action is going to be inserted, and then press and hold the **{MACRO REC}** button. Again the button will turn Red and the record sequence will start, when finished press the **{MACRO REC}** button again to stop recording, and the macro sequence will be added below the highlight bar.

Macro Test and Edit
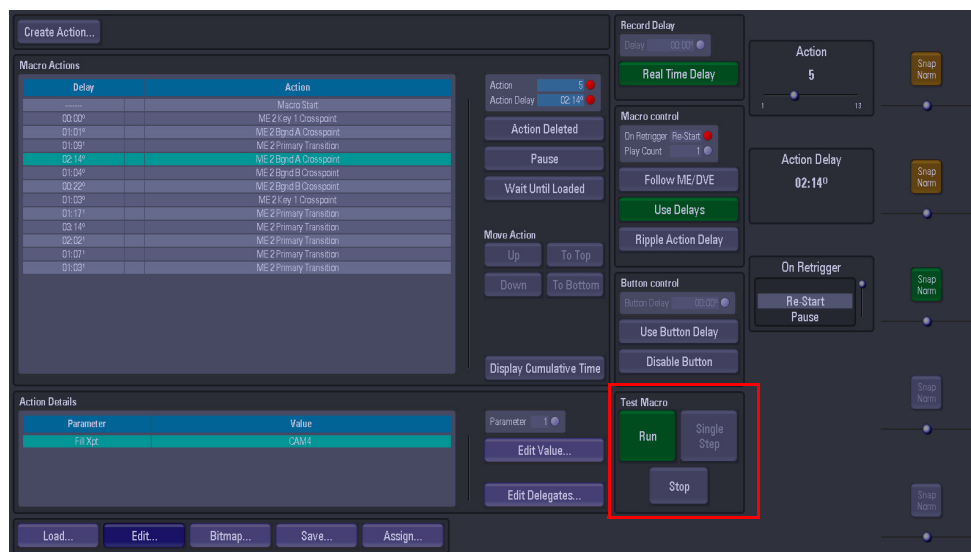
Once the macro has been recorded, to test and edit the actions, touch the **{Macro}** button on the GUI to enter the **Macro - Edit** menu. If a macro has just been recorded, the functions/actions that have just been recorded are displayed in the **Macro Actions** table. In the "Test Macro" area, touch the **{Run}** button to test the macro just recorded. The "**Single Step**" button will run the macro one step at a time and the **{Stop}** button will stop the macro running.

Pause Macro

A macro action sequence can be paused at any selected point, There are two ways to do this. Either use the Action parameter to select a specific point in the action sequence and press **{Pause}**, or press the **{Run}** button to run the macro sequence and then press **{Pause}**, at the required point. The next time the macro is run, the macro will pause when it reaches the chosen point.

Wait Until Loaded

Wait Until Loaded function will make the macro pause until the file operation is complete. 'Wait' can only be turned on for file operations. Waiting macros which get a re-trigger will behave exactly as if they were paused (i.e. they will stop waiting).

RippleDelay Macro

Allows an **Action Delay** that has been set, to be "Rippled" through all Actions in the table from that point onwards.

Pressing the **{Ripple Delay}** button will pop up a Macro Ripple Delay dialog box.

Ripple To Start button will ripple the current delay value to all previous Actions up as far as the first Action in the table

Ripple To End button will ripple a delay from current action to all Actions until the last action

Ripple All button will set all Actions to current delay, and Cancel will cancel the Ripple delay request.
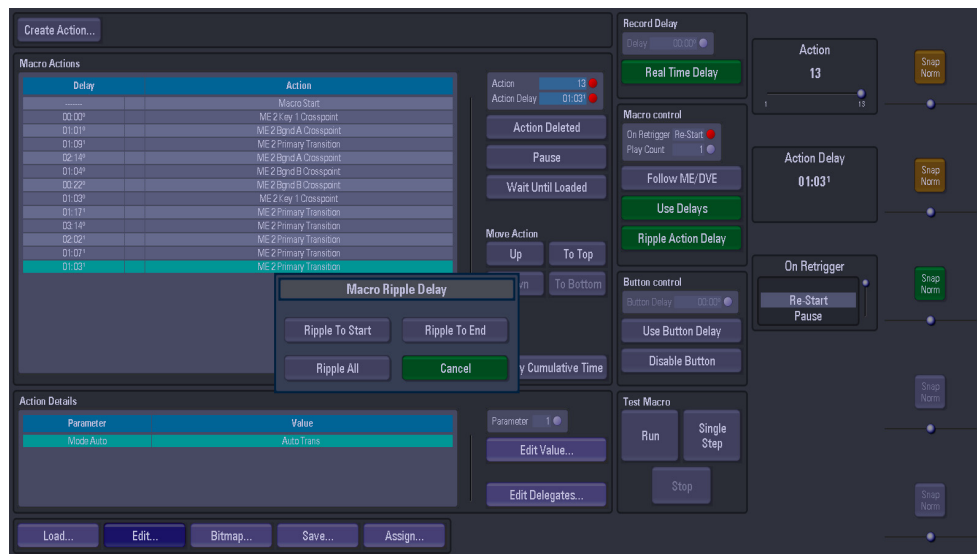
Attacher and Parameter Controls

Follow ME/DVE - this function will overwrite the M/E upon which the macro had been saved, and instead will assign itself to the ME that is selected in the Dynamic Mix Effect area.
This means that a macro that mixes Key 2 on, that had been saved using M/E2 Key 2, can be used on M/E4 Key 2 as long as M/E4 is selected in the Dynamic Mix Effect area of that M/E.

Where the Macro is attached has a bearing on where it will run also. Should a User Function Page be called up on all the User Function Pads on a 4M/E system then the macro will run on each adjacent M/E when the macro is pressed.

Use Delays - this function turns the real-time button press delays On or Off.
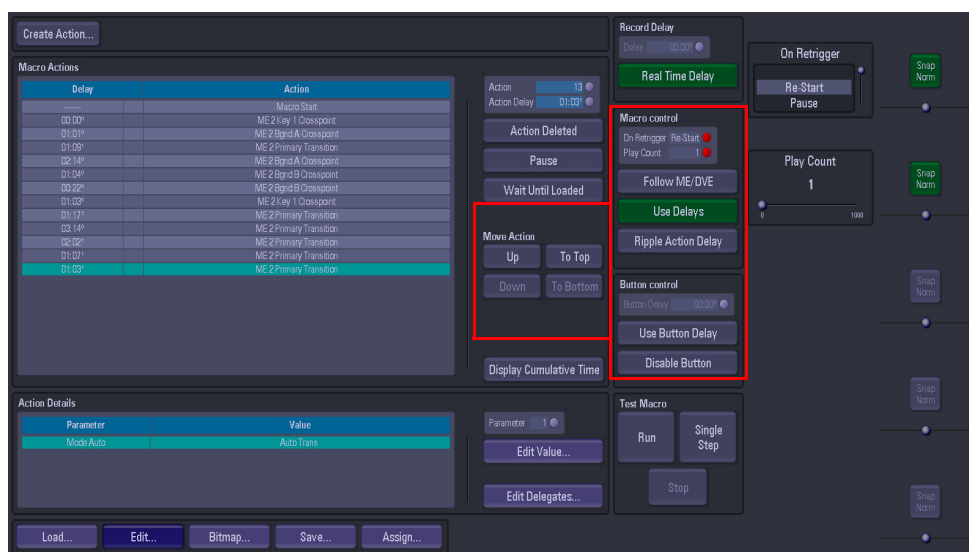
On Re-Trigger - this will set the action after a Macro has been re-triggered, and selects between **ReStart**, **Pause**, **Ignore** and **Stop**.

Action - displays the current Macro Action that the scroll bar is currently on

Use Button Delay - this will allow a delay to be added to the Normal function of the button, so the macro will act and then the Normal function will take place. This can adjust the delay on a selected individual Macro Action, and is used to adjust the 00(time):01(frames) 1(fields) to the required delay.

Disable Button - this option will disable a button's original function and only allow the button to enable the macro that is assigned to it.

Move Action - **Up/Down** will step the action bar up or down one action. **To Top/To Bottom** will move the action bar to the top of the macro action list or to the bottom.

Create (Offline Macro Editor)

The Create - offline macro editor is a clear, simple and quick way to create new macros or edit existing macros whilst the production switcher control surface is being used to produce a show.

The offline macro editor has an intuitive menu structure with all the elements at hand to build the most complicated macros, without having to go though other menus or having to record button presses on the control surface, all within one menu.

Once a macro has been created, the delay between the macro actions, pauses and ripple delay can be edited then tested.

Create Action pull down menus, popup elector Insert" and Exit Actions buttons.

Macro Action Sequence area.
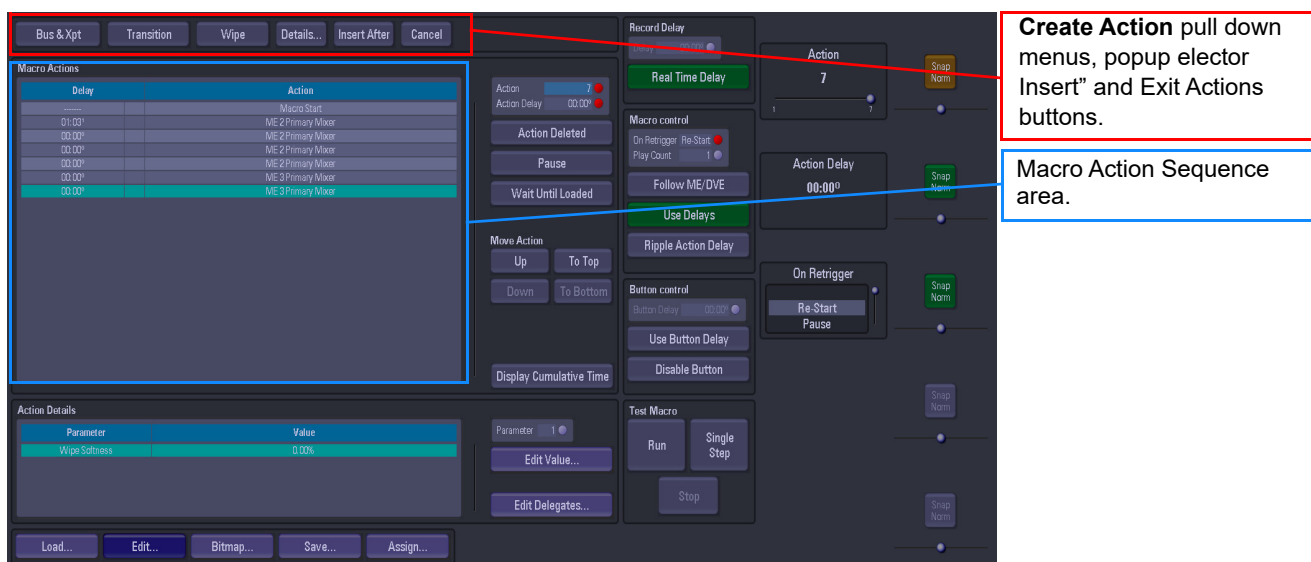
Creating a Macro "Offline"

The following example will go through the steps of making an "Offline" macro for a simple wipe transition.

Open the Macro Edit menu, then touch the "Create Action" drop down menu, the menu will go dark and 6 options will appear; Bus & Xpt, Store, Peripheral, Memories/TL, Options and Miscellaneous. These will be the base for all offline macros.

Select **Bus & Xpt - Crosspoint - ME Bus**.
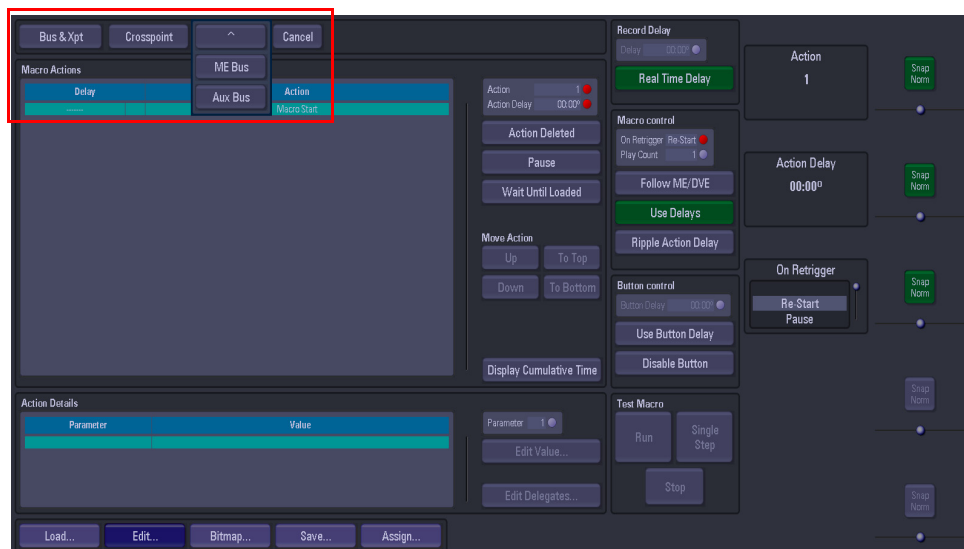
Touch the **{Details}** button and the "**ME Bus Crosspoint"** sub menu will be displayed.
Select **Bgnd A** and **M/E2**, then use the "**Crosspoint**" parameter to select crosspoint 2.

Details Button
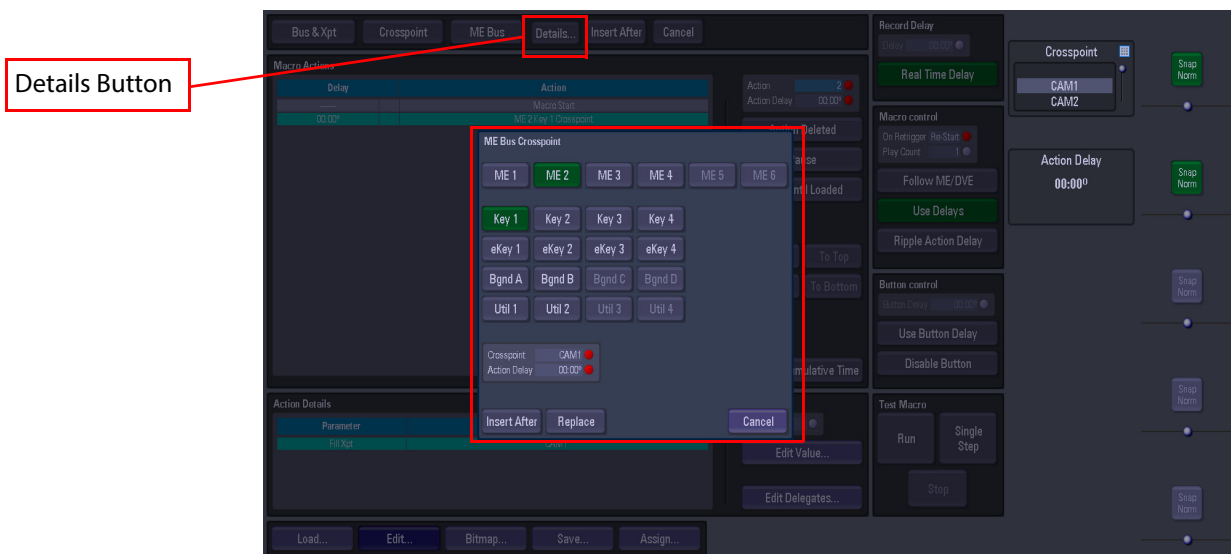
Touch **{Insert After}**.

Next, use the "**Create**" buttons to select **Bus & Xpt - Transition - Wipe**.
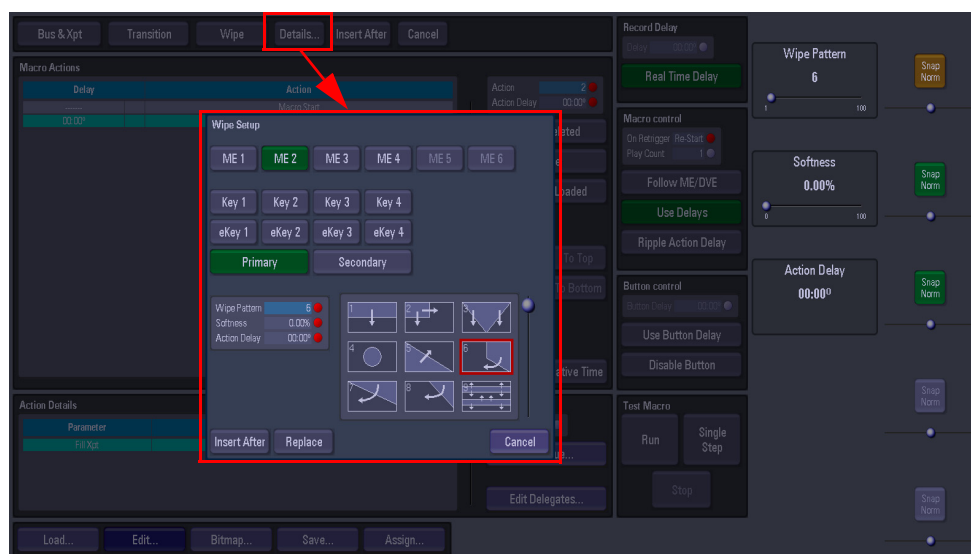
The "**Wipe Setup**" sub menu will be displayed, select **Primary - M/E2** - then use the "**Wipe**"
parameter controls to select a wipe.
Touch **{Insert After}.**

Again, select Bus & Xpt, then select Crosspoint and ME Bus. Touch the **{Details}** button. In the "**ME Bus Crosspoint**" sub menu, select BgndB and M/E2 and then select Crosspoint 3; using the "**Crosspoint**" parameter.
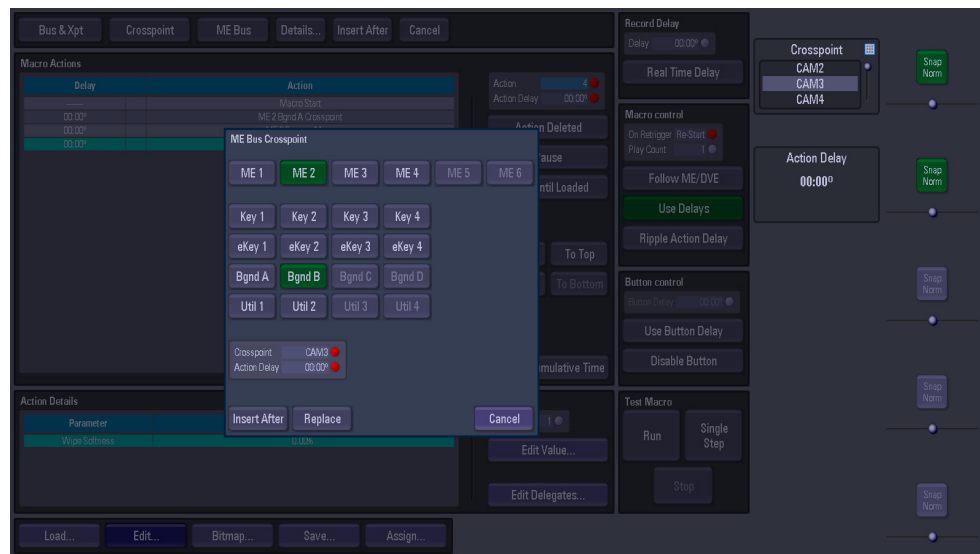
Finally, press **{Insert After}**

Touch the **{Edit...}** button to go back to the "Macro Edit" menu. Touch the **{Test}** button to test that the macro is working.
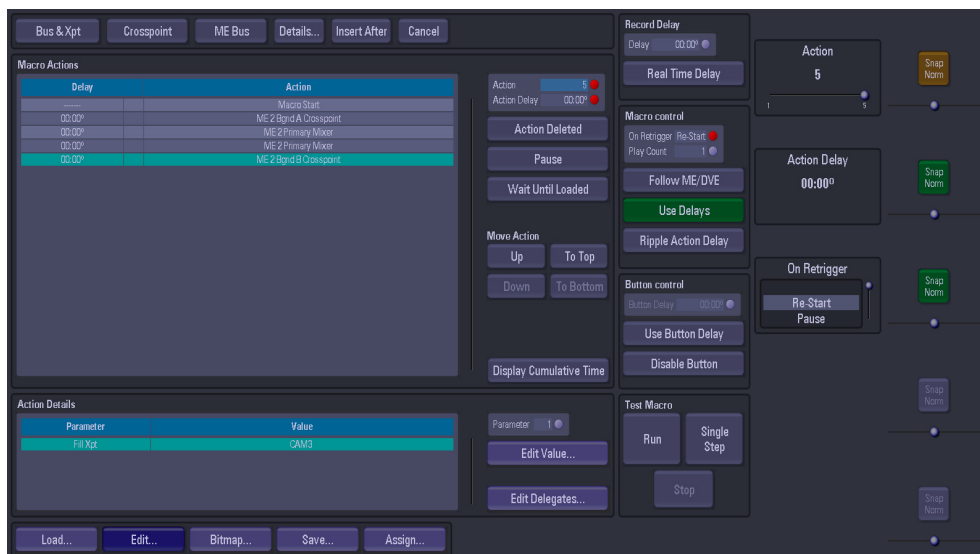
Finally, save the macro to a project.

Edit an existing Macro using the Using Value and Delegate Parameters

There are two ways to edit a macro, the first is to change the value of a recorded action, this means that the user can select an action in the recorded macro list and use the "Edit Value" parameter to change the action of the macro.
For example, if a background crosspoint button was pressed as the macro action, the user can use the "Value" parameter to change the action to a different background crosspoint.

Edit Value Parameter
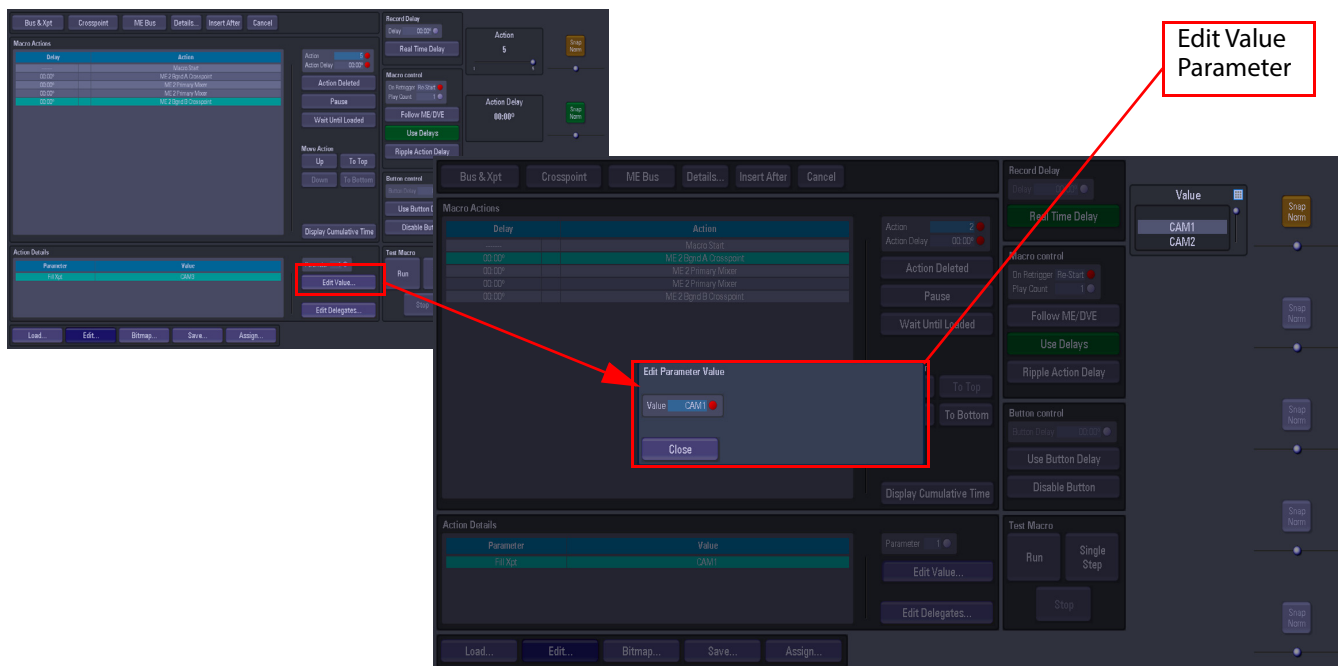
The second way is to use the "**Details"** menu and select a completely different action, i.e. change from selecting a background crosspoint to selecting an eKey or transitions within the selected action.
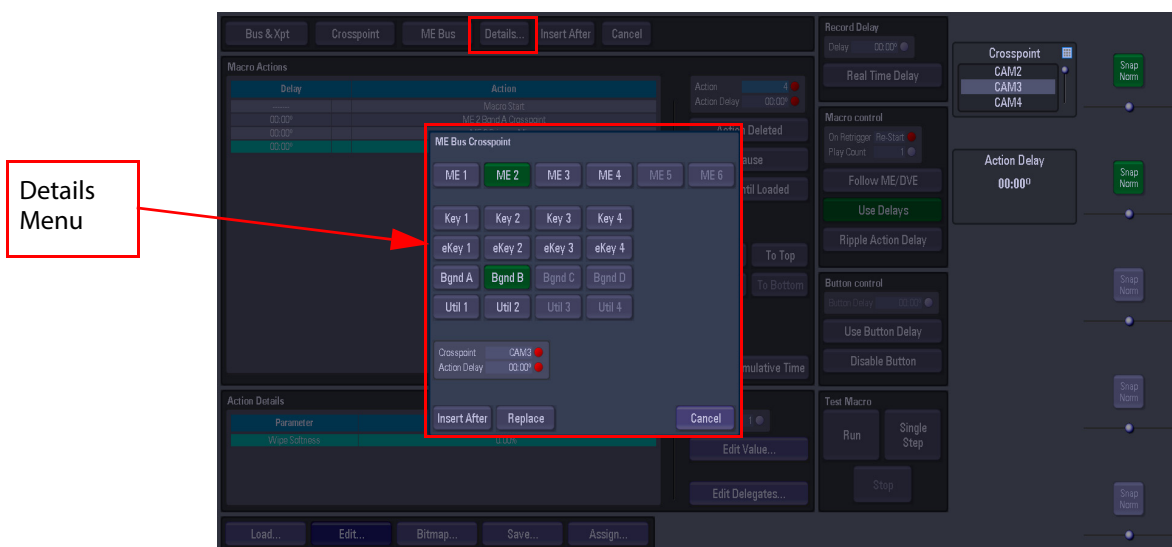
Details Menu

The "Value" parameter and the "Details" options can be used to change actions within any previously save macros in any project. This is done by simply selecting the Project and Macro and loading the macro within the "Macro **Load"** menu.

Bitmap

If a macro is going to be assigned to a User Function Button (LCD Button), a bitmap function button can be generated that will be associated with the recorded macro.

Select the **{Bitmap...}** menu link option from the macro main menu. This will show a large view of a grid representing the LCD button.
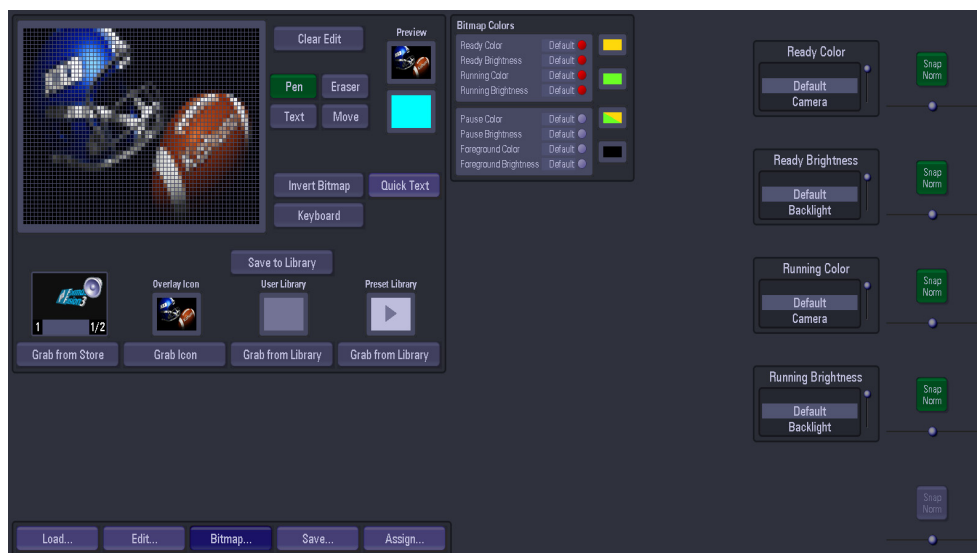
A bitmap from a pre-installed library can be selected using the ***Preset Library*** parameter. A mimic of the Icon will appear in the larger grid to the left of the menu as you run through the library of bitmaps, a user defined library can also be selected in this way.
Once the required icon is found, press **{Grab from Library}** action button and this will place the library icon on to the bitmap grid area.
To create an icon or hand write text in the grid area, select **Pen** from the **Draw Mode** parameter and the user can create their own icons by drawing in the large grid area. To delete any mistakes in the grid, select **Eraser** in the **Draw Mode** parameter and rub out the mistake in the grid.
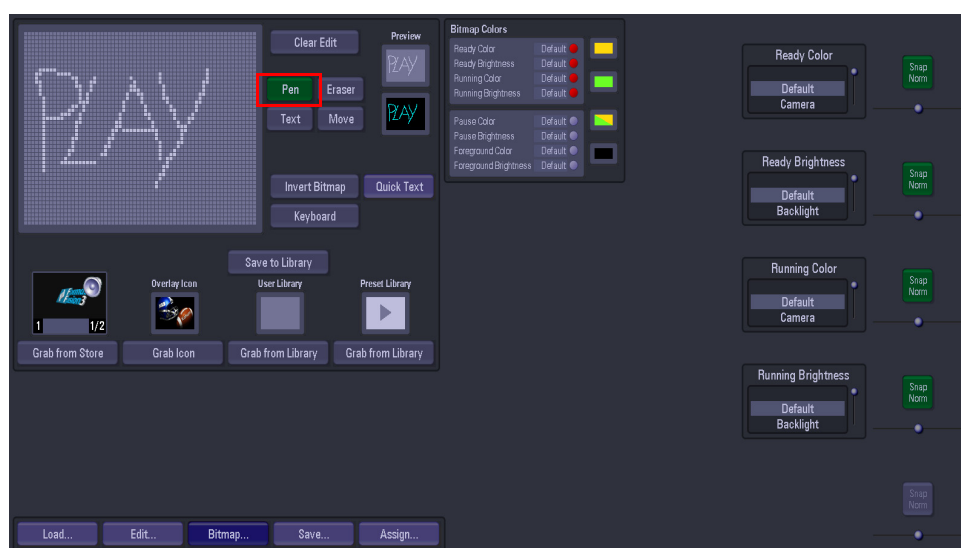
When satisfied with the icon press the **{Save to Library}** button and the icon will be saved to the User Library.

Text characters can also be entered into the bitmap grid area, select **Text** in the **Draw Mode** parameter, then select the required font size in the Font parameter, then using the on-screen or USB keyboard enter the text required.

This menu will also allow the user to create a bitmap, insert text like the Macro Bitmap menu, but it also allows the user to associate Icons or Store grabs as images for the OLED user function buttons attached to macros.

Touching the **{Grab From Store}** or **{Grab Icon}** buttons will display new parameters, allowing the user grab an image (frame) from the selected store, or scroll through the Icon library. As with the Macro Bitmaps, these can be saved with a macro and attached to a user function button.

When happy with the Bitmap in the display, move onto the **{Save}** menu.

Quick Text

Entering text into the bitmap grid can take a little time to get the text into the correct position with the right font size. The "**Quick Text**" menu allows you to quickly place text into the gray bitmap square and whilst typing, the text automatically size itself within the boundaries of the bitmap grid.

Touch the **{Quick Text}** button and the "**Quick Text**" menu will be displayed. Turn the "Auto Font Size" parameter to "On" and then start typing the text with the on-screen keyboard.

As more text characters are added the font will auto size itself the size of the quick text box grid. Text can also be aligned more accurately using the "Alignment" buttons.

After finishing entering the text, touch the **{Apply}** button.

Saving a Macro

After creating a macro, the user is presented with several options to save the macro.
Going through the sequence of creating a macro, following the normal macro record process, and if you are in the "**Macro - Edit**" menu, you can see the macro sequence being recorded into the "**Macro Actions**" table.
To stop the record sequence, touch the **{MACRO REC}** button once again and a "**Record Macro Completed"** dialog box will be displayed (see the diagram below).
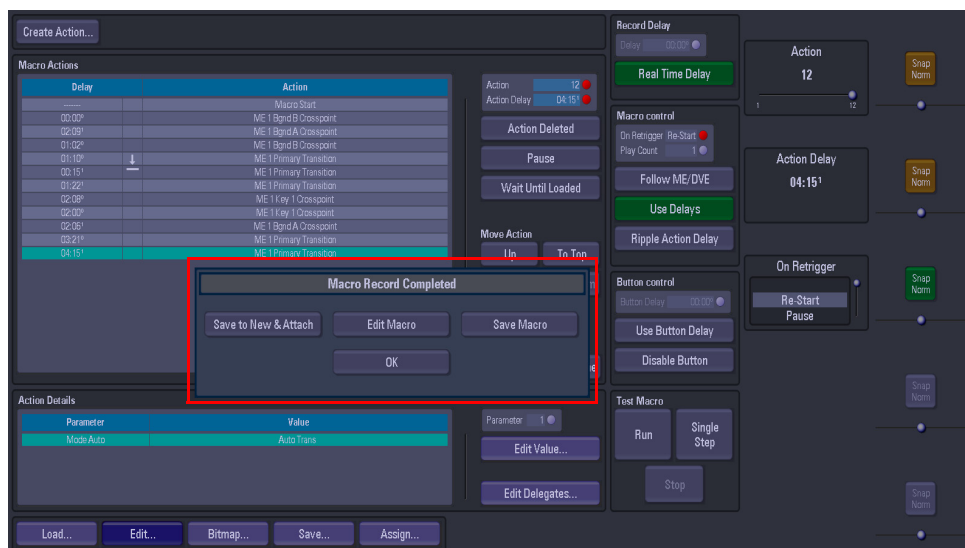
The dialog box displays 3 options:

- **Save to New & Attach** - this saves the recorded macro to the next available slot in the "**Macro - Save**" table in the currently selected project. Whilst in this state the control surface buttons are lit white and display a pulsating effect, waiting for you to select a button to attach the macro.
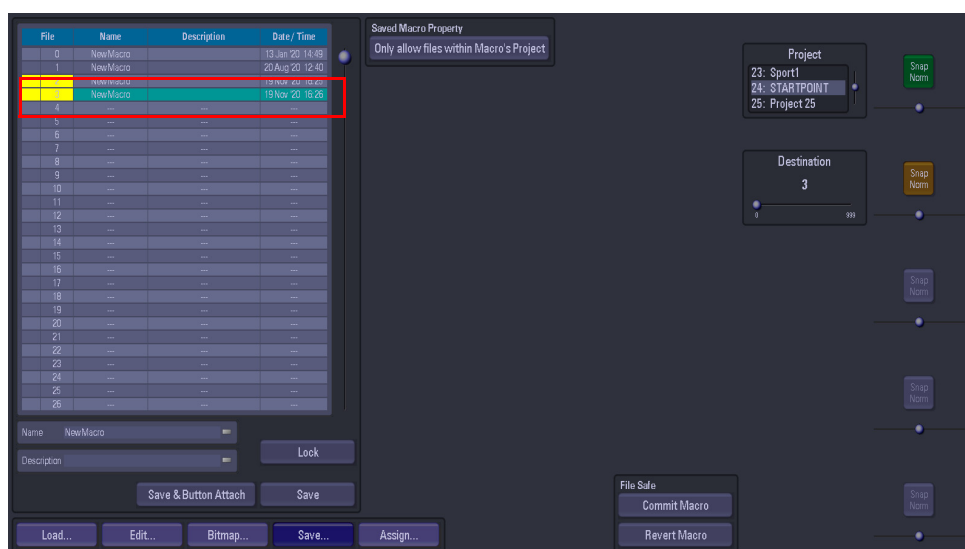
- **Edit Macro** - this allows you to go back into the **"Macro - Edit"** menu and edit the current macro.

- **Save Macro** - this saves the recorded macro to the next available slot in the "**Macro - Save"** table in the currently selected project.

There is a more manual way to save a macro, using the following information.
Once the macro has been setup, configured and a bitmap has been chosen, the next step is to "Save" the macro.

In the "**Macro-Edit**" menu, touch the **{Save...}** menu link button to enter the **Macro - Save** menu, then using the parameter controls, select a **Current Project** and a **Destination** within the **Macro Save** table.
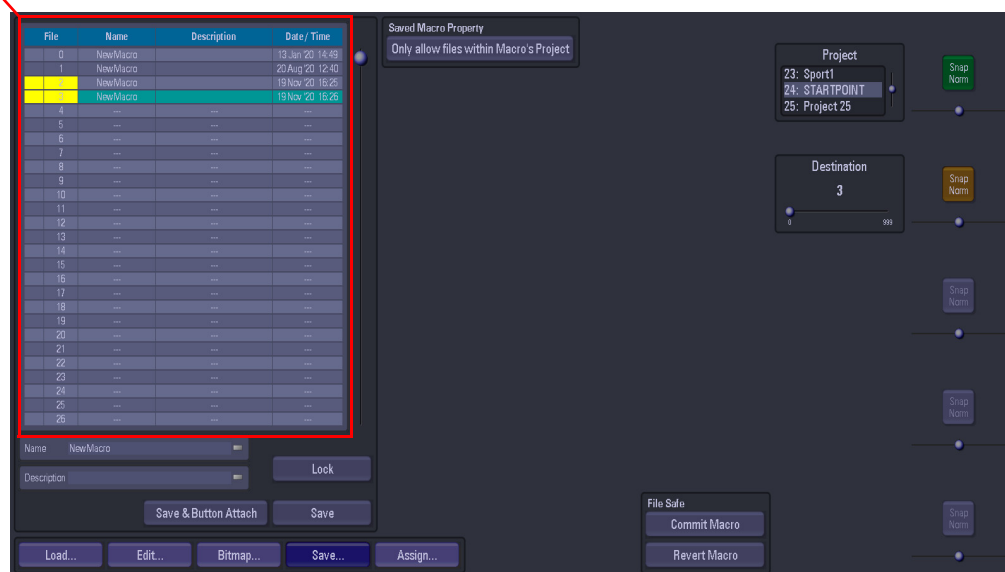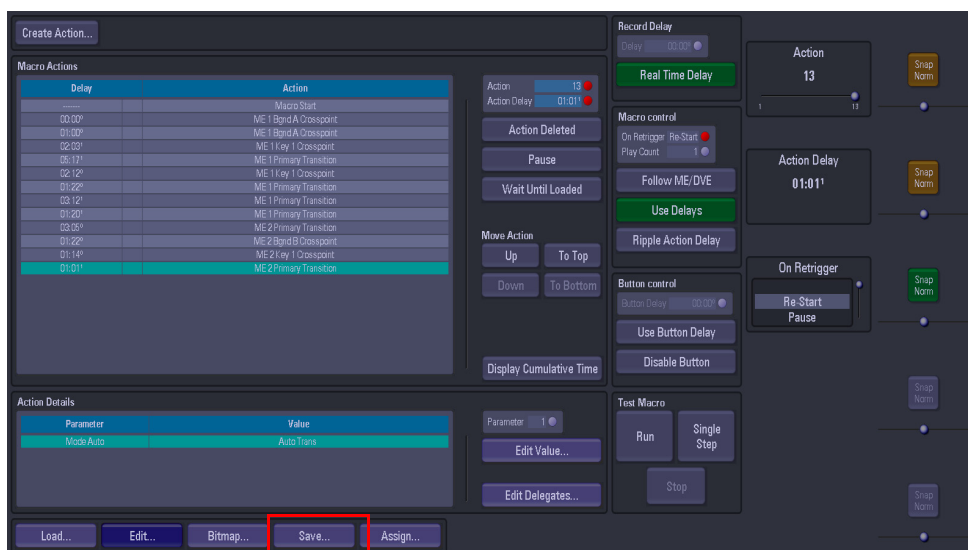
A Name and Description of the macro can also be added by touching the Red attacher button twice, and entering the required name and description using the on-screen or USB keyboard.

Finally, press **{Save}** and the macro will be saved to the Hard Disk along with any associated Bitmap, Store image or Icon image.

If the user then assigns the macro to a user function OLED button, the bitmap image from the grid is also assigned to the button.

Note: Up to 1000 macros can be saved in a single Project.

Assigning Macros to buttons

Press the **{Assign...}** menu link button, the Macro Assignment menu will then open, this menu has a table that displays a list of macro's that are saved within projects.

To attach a macro to a button on the control surface, first select a project using the Current Project parameter and then select a macro within that project.

Press the Button Assignment **{Attach}** button and the button will go Red. All the control surface buttons will now go out ready for the user to select a button; buttons with macros already assigned will go Green. If the selected macro is already assigned to a button it will be lit Red.

> Note: The same macro can be assigned to as many buttons as required.

Press the button on the control surface where the selected macro is going to be attached, the panel will return to the normal configuration and the macro will be attached to the button.

To detach a macro from a button on the control surface, press the **{Detach}** button, once again the button will go Red. The control surface lights will go green for buttons with macros attached and any button which has the currently selected macro in the table will be lit Red. Press the button you want to detach the macro from. The control surface will now return to its normal configuration. The **{Detach}** button in the menu will go Gray and the macro will no longer be associated with that button.

> Note: The macro is not deleted the from the project, just removed from the button it was attached to.

To find out which macros are attached to buttons, press the **{Locate}** button on the GUI, any button on the panel with a macro associated with it will either be lit Green or Red as described above.
Pressing a button on the control surface which has a macro attached will highlight the macro in the table. This will work in reverse as well, to find the particular macro, touch on it in the macro table, then press the **{Locate}** button. Any button with that macro attached will light Green.

You can view the saved macro files as the bitmap icons assigned to the macro file or view the file in a file table list.
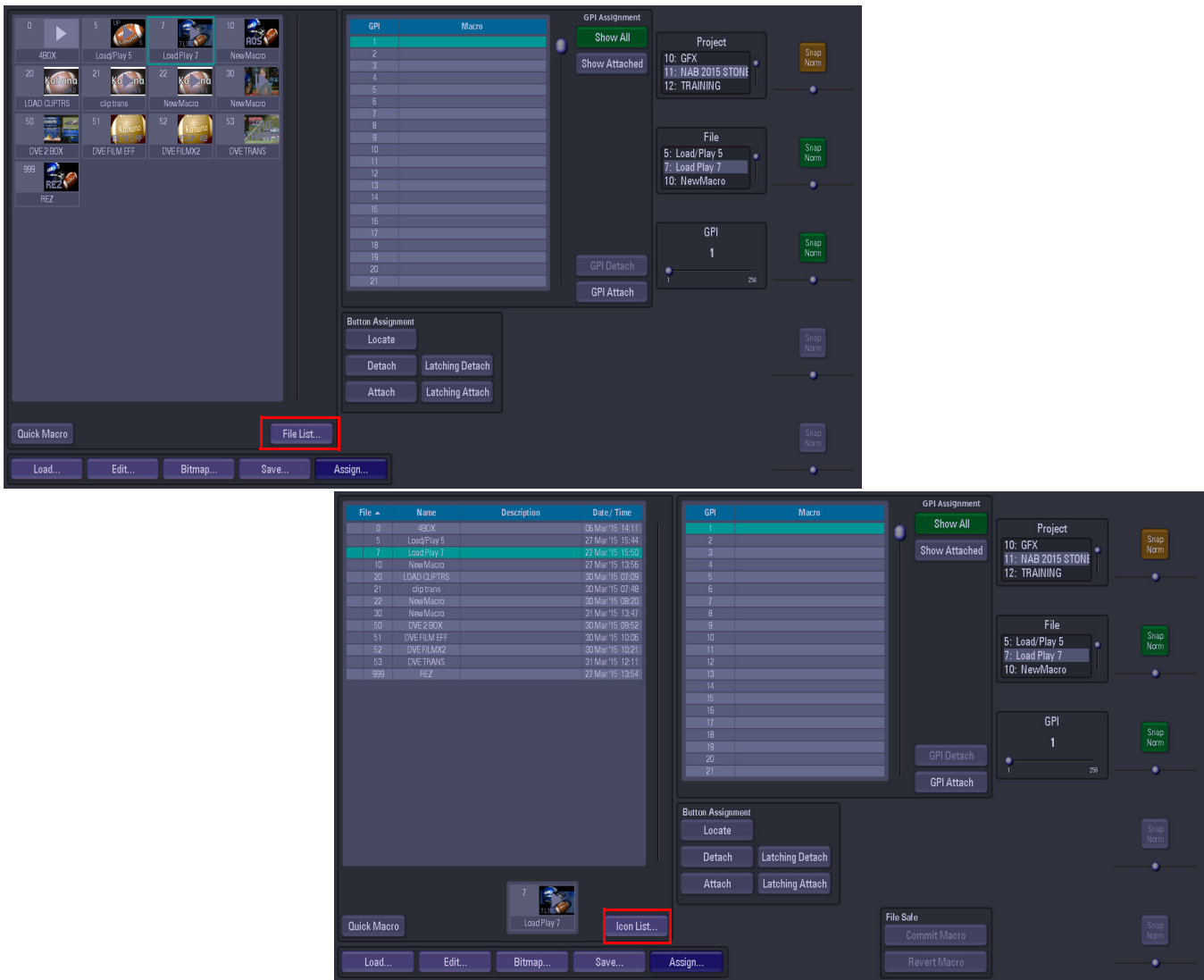
The macro "Assign" menu in the diagrams above display the saved macro files as "**Bitmaps**" in the top menu and as a "**File List**" in a table. The buttons highlighted at the bottom of both of the menus allows you to switch between the two menu types. When in the "**Bitmap Icon**" menu, touch one of the macro icons to select it, then use the **{Attach}** button to attach a macro to a button.

The same method is used for the "**File List**". Touch one of the macros in the table, if a bitmap has been assigned to the macro, it is displayed just below the table, then use the **{Attach}** button to attach a macro to a button.

GPI Assignment

This function allows an external device to control a saved macro. The GPI parameter control selects the GPI pin that the external device is connected to. The selected GPI pin and attached macro are displayed in a table in the GPI Assignment area.
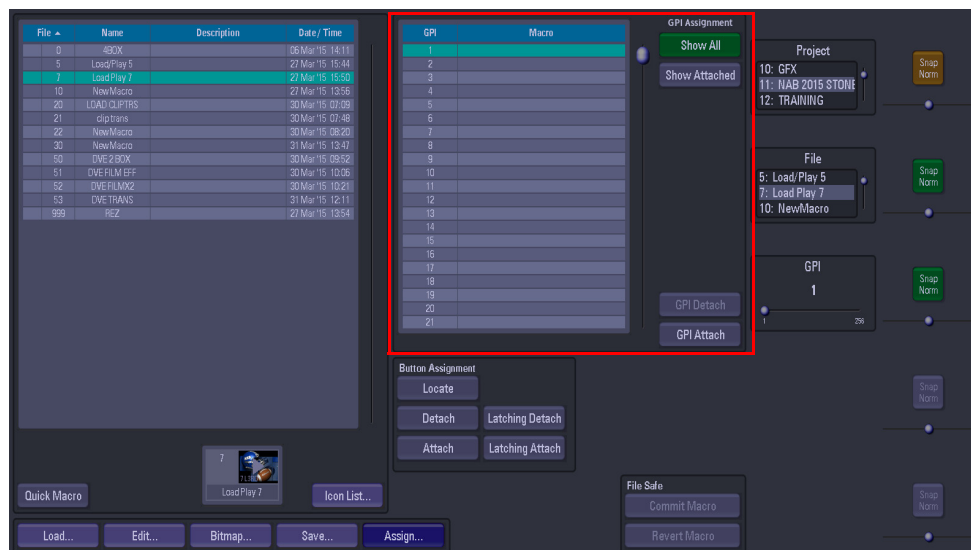
To attach a macro to a GPI pin, select the macro in the macro file table, and then use the GPI parameter to select the required GPI, once the correct GPI pin has been selected, press the **{Attach}** button to attach the external device to the macro. The table next to the Attach/Detach buttons displays the GPI pin and the attached macro.

To Detach a macro from a GPI, select the GPI/Macro in the table and then press the **{Detach}** button, this will detach the GPI pin from the external device.

Macro Load

The macro load menu will load a Macro into the active buffer, the macro can then be edited and tested.
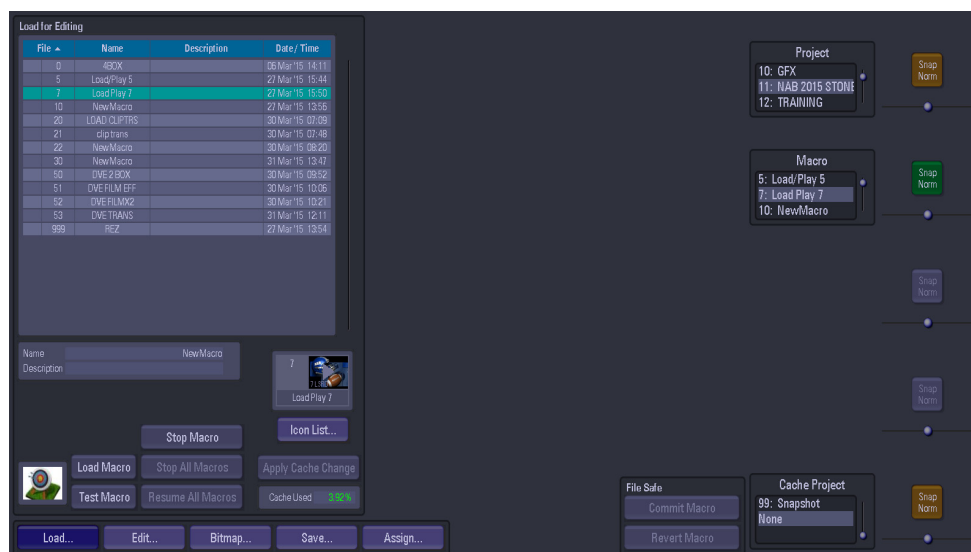
Select a **Project** using the Project parameter control, notice that if a project has any macros attached they are listed in the Load for Editing table.

Once a project has been selected, a macro can then be selected using the Macro parameter control. The project and the macro are also listed in the Name/Description information bars below the table.

{Load Macro} - will load the selected macro.

{Test Macro} - will run the macro function.

{Stop Macro} - this will stop the currently selected macro from running.

{Stop All Macros} - will stop all running macros.

{Resume All Macros} - when a macro is running this button light Orange, if a macro has had a pause inserted, the macro will run until it reaches the pause and will stop, the Resume All Macros button will flash along with the **{Test Macro}** button. Press the Resume All Macros button to start the macro running once again.

If a macro has a bit map associated with it, this will be displayed in the Gray bitmap display next to the Test Macro button.

Cache Project - parameter is used to select a project where all the macros will be pre-loaded i.e. cached (**Cache Used** is an indicator to show how much memory is used)

Apply Cache Change - will apply any change to the Cache Project number.

> Note: If it is updated as the parameter is changed many files would load/unload as each project was passed!

Cached macros can be used by **Timelines** or the Macro Protocol and will always be available so the timeline will be able to trigger them reliably.

The macro cache project is stored under user config with a new enable.

In the Macro "Load" menu, as with the Assign menu, you can now view the saved macro files as the bitmap icons assigned to the macro file or view the file in a file table list.
Touch the **{MACRO}** button on the GUI and then touch the **{Load...}** button.
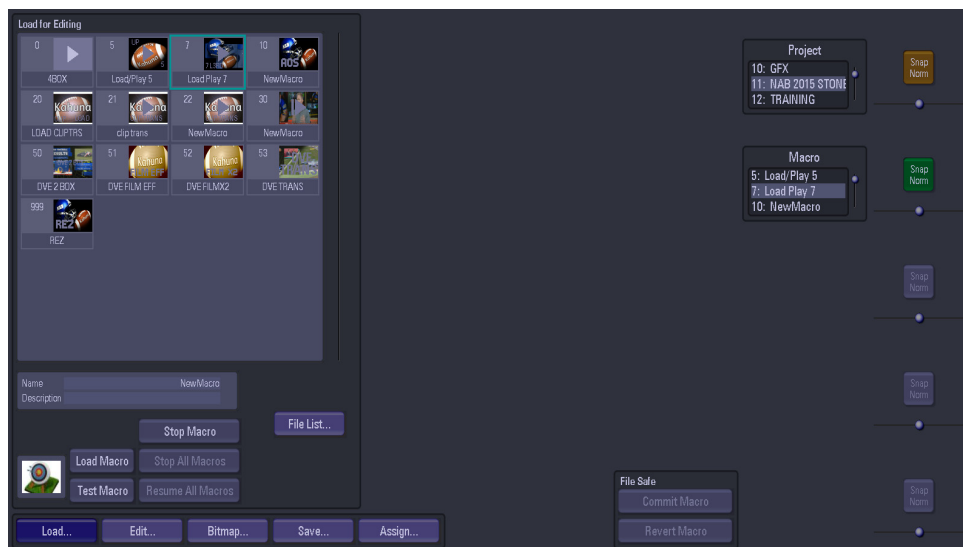
The macro "**Load**" menu in the diagram above displays the saved macro files as a list in the table. If you touch the macro icon, then the file list will change to display macro icon thumbnails (as shown below).
Touching the **{File List...}** button will change the icon thumbnails back to a file list table.
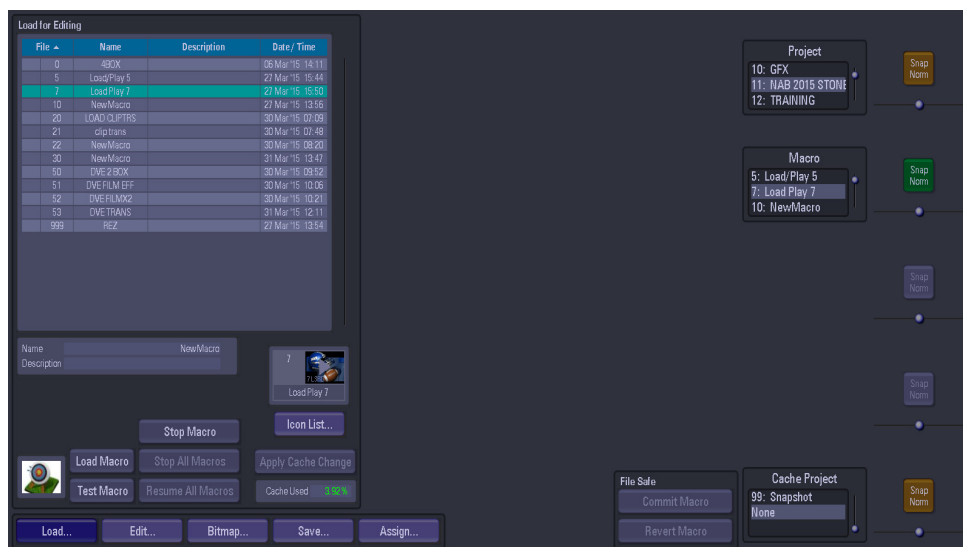
The macro "Load" menu in the diagrams above display the saved macro files as "**Bitmaps**" in the top menu and as a "**File List**" in a table. The buttons highlighted at the bottom of both of the menus allows you to switch between the two menu types. When in the "**Bitmap Icon**" menu, touch one of the macro icons to select it, then use the **{Load}** button to load a macro. The same method is used for the "**File List**". Touch one of the macros in the table, if a bitmap has been assigned to the macro, it is displayed just below the table, then use the **{Load}** button to load the selected macro.

Timelines

Timeline Overview

Modern switchers now have so many powerful features that conventional keyframing has become too unwieldy. Kahuna introduces a timelining system that works in a different way.

Presented in a way that will be familiar to users of many different systems, Kahuna looks out for the changes the user makes and records just those things. Each parameter that the user changes and records is presented on the GUI in a clear, graphical way. The touch-screen allows the user to easily organize, explore and make changes to those recorded changes. Individual values can easily be adjusted, moved, or removed very interactively. Related parameters can be collected together and moved as one.

Timeline Edit Buttons

To use the Timeline functions, touch the **{SHORT CUTS}** button on the GUI and then touch the **{Timeline Edit...}** menu link button to open the "**Timeline Edit**" menu. The **Timeline Edit** buttons on the control surface splits into two sections. The 3 columns of buttons to the left relate to timeline editing and navigation. The 2 columns to the right relate to enables.

Timeline Edit Buttons
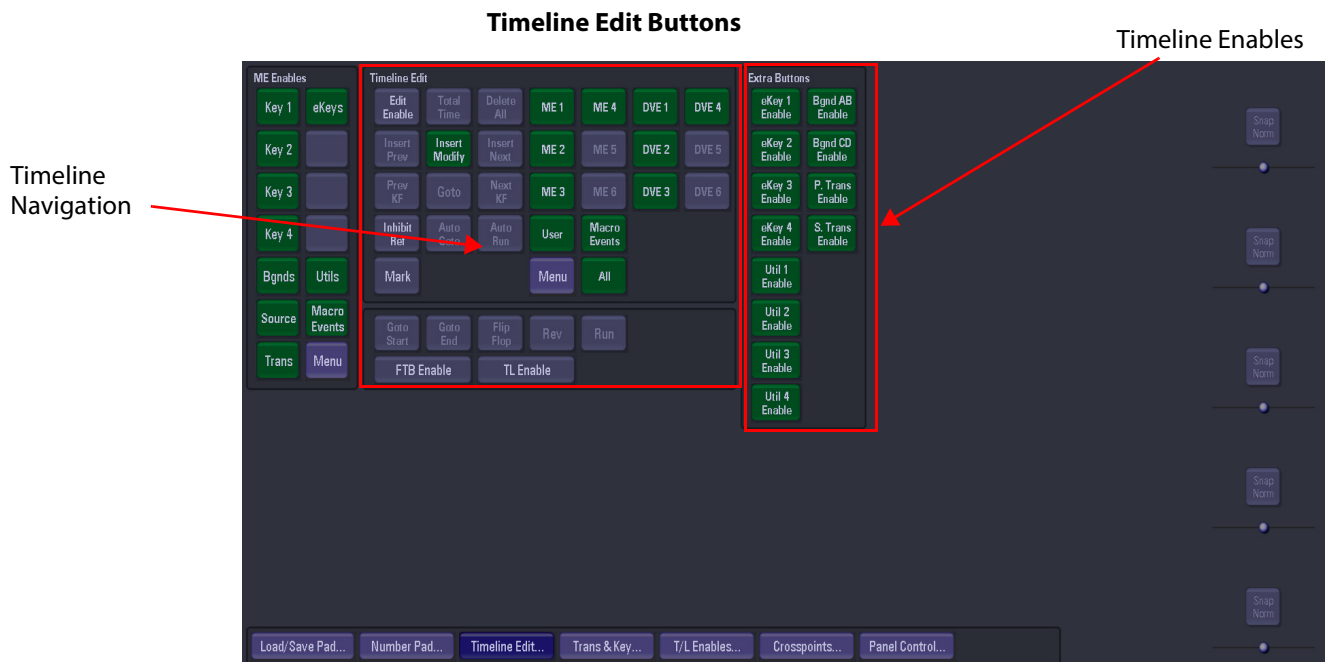
The Edit Enable button at the top left, controls the timeline edit facilities. Most of the edit buttons are only effective when the **{Edit Enable}** button is active (lit green).
The Enables buttons in the **Timeline Edit** area are Enables buttons for the switcher and its modules. Enables for the M/E Layers are in the M/E Enables keypad on each M/E bank of the panel.

Transport Control (using the MAV-JOY module)

The **Transport Controls** can be delegated to control either **[FTB]** or Timelines via the Timeline Edit menu as shown below. The controls are delegated to run timelines when the **{TL Enable}** button is lit green.

Timeline Run Controls

Toggle Buttons
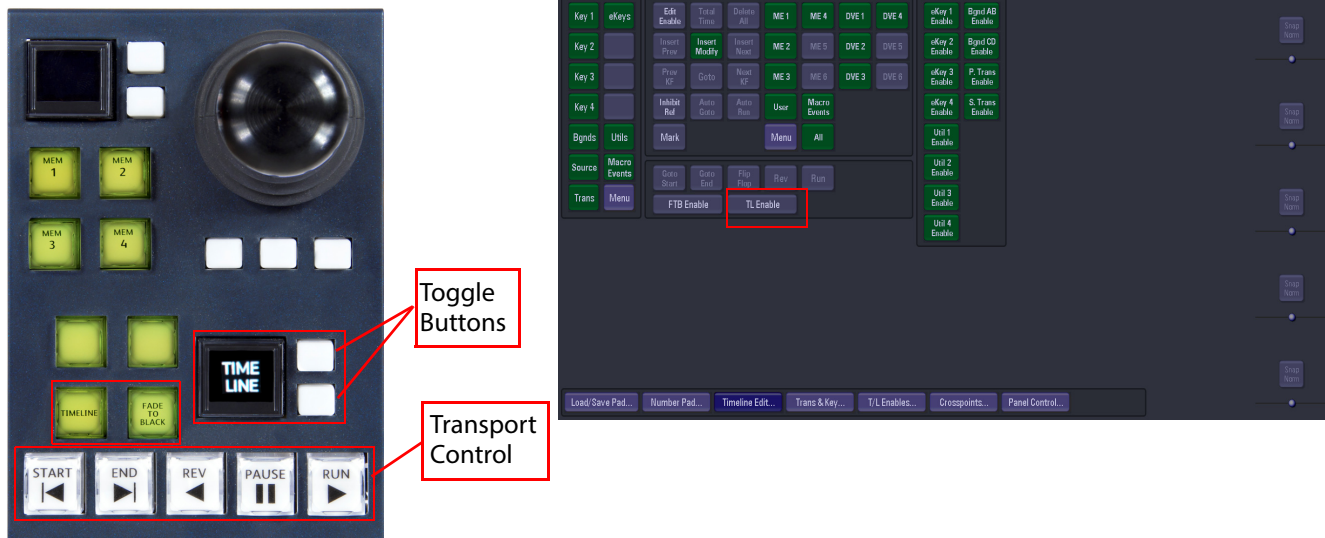
Transport Control

MAV-JOY module

The MAV-JOY module can be used to control "**Fade to Black**" and the "**Timeline**" Run functions. Use the "Toggle" buttons next to the OLED button to toggle to the "**Timeline**", then press the **[TIMELINE]** button. The user can now use the transport control buttons to control a timeline. When in Timeline enable mode, the transport controls have the following actions:

GOTO START

The **{Goto Start}** button moves all the current positions within the timeline to the start position of the timeline. Note that in reverse mode the Start of the timeline is actually the end most time of the total timeline.

GOTO END

The **{Goto End}** button moves all the current positions within the timeline to the end position of the timeline. Note that in reverse mode the End of the timeline is actually the start most time of the total timeline.

FLIP FLOP

When the **Flip Flop** control is switched on (lit green), the direction of travel of the run control will flip between forward and reverse at the end of each travel.

REV

The **{Rev}** Button controls (and indicates when in Flip Flop mode) whether the timeline will run in forward or reverse mode (lit green for reverse mode).

RUN

The **Run** control puts all the levels of the timeline into run. The direction of travel depends on the Flip Flop and Rev settings. During run, only enabled parts of the timeline will be applied.

Cloning Transport Controls

The Transport Control buttons can be cloned to the **User Function** buttons using the standard Kahuna Copy/Paste functionality.

To clone a button, double press the **{COPY}** button on the GUI, holding down the button on the second press. Whilst holding down the **{COPY}** button, press and release the Transport Control button that the wishes to clone. Release the **{COPY}** button then double press the **{PASTE}** button on the GUI, holding down the button on the second press. Whilst holding down the **{PASTE}** button, press and release the User Function button on which the user wants the clone to be created. Releasing the **{PASTE}** button will complete the clone.

In order for cloned Transport Control buttons to work, it is necessary to have the **{TL Enable}** button cloned on the same User Function pad and switched on (lit green).

Timelines On Multiple Control Surfaces/ Logical Switchers

A Kahuna system can be configured as multiple switchers. Each switcher will contain its own individual Timeline. A panel can only connect to one switcher at a time, however more than one panel can connect to the same switcher at the same time, and thus to its timeline.

The Transport Controls of all connected control surfaces can move or run the timeline of the switcher they are connected to. However, only one panel can have edit capability of the switcher's timeline at any one time. Edit capability is controlled the **{Edit Enable}** button on Timeline Edit keypad.

If the **{Edit Enable}** button on your panel is unlit, then no panel has edit control on the timeline. Pressing the button should make it light green, indicating that your panel now has edit control of the timeline.

If the **{Edit Enable}** button on your panel is lit orange, this indicates that another panel has edit control of the switcher's timeline. Pressing and holding the button should make it light up green, indicating that your panel now has edit control of the timeline.

Basic Tutorial

Creating a timeline without using the GUI

1. Turn on a key-layer, and ensure the key mode is set to **[FULL]**.

    Check that the changes can be seen on the M/E output as different crosspoints are selected. At least two working crosspoints will be needed for this example.

2. Select one of the working crosspoints.

3. To ensure everything is enabled, touch and hold the **{ALL}** button (on the right-hand side of the **Timeline Edit** buttons) for about 2 seconds, until anything lit orange goes green.

    This enables everything in the switcher.

4. Press the **{Edit Enable}** button to activate timeline editing.

    It should go green. If it's orange, press and hold for 2 seconds.

5. Press 'INSERT/MODIFY'.

    The 'INSERT/MODIFY' button lights up green.

6. Change to another crosspoint on the key-layer.

    *Observe that the three **INSERT** buttons light up green.*
    These buttons go red to indicate that the system has detected that a parameter has changed.

7. Press **{Insert Next}**

    The 'INSERT/MODIFY/REFERENCE' button goes back to green.

8. Change the crosspoint on the key-layer again.

    *Observe that the three **INSERT** buttons light up red again.*

9. Press **{Insert Next}**.

    The 'INSERT/MODIFY/REFERENCE' button goes back to green.

    *Observe the pattern. To add keyframes, make a change to one or more parameters, and then press **{Insert Next}** to record that change in the timeline.*

10. Now turn on **MATTE FILL** for the key-layer.

    Observe that the three 'INSERT' buttons light up red again.

    *The **Assignable Controls** will attach to the key-layer's Matte color. The last parameter control should be set to **Matte Select** "Local Matte" - change it if it is not.*

    The M/E output will now show the Matte, which by default is red.

11. Press **{Insert Next}** to create another keyframe.

12. Change two or more of the 'Hue', 'Luma' and 'Sat' controls.

13. Press INSERT **{Insert Next}** to create another keyframe.

    *To run the timeline, the transport controls need to be delegated to the timeline. This is done with the **{TL ENABLE}** button.*

14. If the **TL ENABLE** button is not lit green, press it.

    *The **TL ENABLE** button lights up green.*

15. Press **{Run}** and watch the output of the M/E.

    *As soon as **{Run}** is pressed, the switcher automatically jumps back to the start of the timeline and starts playback.*

    The output immediately reverts to the first selected source.

    After 1s the next crosspoint is selected, and so on until the Matte Fill is activated.

    Immediately, the color of the matte fill will start to change, and continue to change for 1s.

    After that the timeline playback will stop and the RUN button will go out.

16. Try pressing **{Run}** again.

    The timeline runs again.

17. Press the **{Rev}** button.

    It will light up green.

18. Press the **{Run}** button.

    The timeline runs backwards.

19. Press the **{Rev}** button again to deactivate reverse play.

    Its light will switch off.

20. Return to the start of the timeline by pressing the **{Goto Start}** button.

    Editing a timeline without using the GUI

21. Change to a different crosspoint on the key bus.

    *The three **INSERT** buttons light up green again.*

22. Press **{Goto Start}** again.

    This "asserts" the timeline.

    The key-layer's crosspoint returns to the follow the timeline.

    *The three **INSERT** buttons stop being green, as the values in the system now match those in the timeline.*

23. Change the crosspoint back to the one in step 21.

    *The three **INSERT** buttons light up green again.*

24. Press **{Insert Modify}**.

    The first keyframe in the timeline has been updated with the new crosspoint.

    *The three **INSERT** buttons stop being green, as the values in the timeline now match those the system.*

25. Press **{Rev}**.

26. Press **{Run}**.

    This time, the timeline finishes on the updated crosspoint.

    Navigating around timeline without using the GUI

    The M/E output should now be showing the first crosspoint in the timeline.

27. Step through the timeline with the **{Next KF}** button.

    Each press takes the switcher to the next keyframe, which for this example will be the next crosspoint.

    *Keep moving forward until the **Matte Fill** is activated.*

    Another press will move to the end of the timeline.

    *Once at the end, pressing **{Prev KF}** and then **{Next KF}** repeatedly should switch the output back and forth between the two colors that were smoothly moved between when the timeline was run.*

28. Move to the end of the timeline with the **{Next KF}** button or the **{Goto End}** button.

    *Note that '**Goto End**' and '**Goto Start**' swap functionality if '**Rev**' is on.*

    Saving a timeline without using the GUI

    Timelines can be saved in DMEMs. A DMEM will always contain a snapshot, but can also contain a timeline

29. To save a DMEM with a timeline, enter a project and file number (separated by a dot) using the number keypad in the usual way.

30. Using the buttons to the left of the number pad, select the M/E that the timeline was recorded on.

31. Press the '/' key to include the timeline in the DMEM.

32. Press **{Save}**.

    Loading a timeline without using the GUI

    Try loading the DMEM into another M/E.

33. Enter the project and file number used in the steps above.

34. Press the M/E button that corresponds to the different M/E that the user wishes to load the timeline into.

35. Press **{Load}**.

    The timeline is loaded into the second M/E.

36. Press **{Rev}**.

    The timeline runs on both M/Es simultaneously.

    If output cannot be seen from the second M/E, look at the crosspoint selection buttons to see that they are changing.

Concepts

Partial Keyframing

Kahuna timelining system is based on partial keyframing. This has long been seen as the most flexible way of controlling changing parameters, but is technically difficult to implement. Traditionally, a 'keyframe' contains an entire set of values for all of the parameters in a system. That entire set of values will always be 'contemporaneous' (meaning they will be applied to the system at the same time). One of the problems this causes is that there are many, many stored values that never change. If the user wants to change any of these constant values, that change must be propagated to all of the keyframes. Often, systems provide tools to make these kinds of edits less painful. Even so, this mode of operation makes the technique of building up effects by layering changes on top of each other very difficult.

A keyframe in Kahuna (nearly always) only contains one value for one parameter. It is not tethered to a particular point in time just because some other parameter has a value at that point in time. Keyframes containing values for different parameters do not have to exist at the same point in time, nor must there be the same number of keyframes as any of the other parameters - they all exist independently of one another. Although this gives the user a great deal of control, none of this flexibility stops the user creating and editing simple timelines using just the **Timeline Edit** buttons. It is still very straightforward to navigate the timeline by moving from keyframe to keyframe, making changes to any parameter and recording that change in the timeline with the **{Insert}** button. When finer control is needed, the timeline menu can display and edit the individual parameter tracks. It can also summarize all of the timelines in the switcher.

Put simply, each parameter gets its own track. Each track can have any number of keyframes on it, and they can be put wherever they are needed. Those keyframes can span any period of time within the timeline.

This keyframing system often brings up the question of how all the other parameters are controlled. For example, "If the timeline only contains a track that controls the Hue of my Matte, how does the system ensure that the Luma and Saturation are set correctly?" Maybe the user is experimenting with a darker Matte, or maybe the user accidentally knocked the Saturation parameter. Another good example is recalling some animated two-box effect - only a few parameters change in the effect, but a significant number of other parameters were set up carefully to make those boxes appear at all.

At the same time as keeping an eye which parameters are being changing, Kahuna is also keeping a snapshot of everything else. Whenever a timeline is loaded or run, it pushes all the remembered values in this snapshot back. This action returns all the parameters to the values they had when the timeline was recorded. This snapshot is called the **Reference Point**, and it plays an important role during the creation of the timeline, too.

The Reference Point

As was demonstrated in the first tutorial, in order to create a timeline, first set up the switcher in some starting state. To record that initial state, press the **{Insert Modify}** button. This may seem like it creates the first keyframe, but it actually creates the Reference Point. As was explained above, the timelines duties are restricted to things that change. All that has been done with that first button press is inform the switcher of the timelines starting state - not only has no change yet been made, the switcher has no idea which parameter(s) that is about to be change.

Once something is changed, the timeline **"INSERT"** buttons light up green to indicate that change has been detected. Pressing **{Insert Next}** then creates two keyframes for each change. The first contains the remembered value from the Reference Point, and the second is created from the new value.

The Reference Point is no longer responsible for remembering values of parameters that now have a timeline track. Those parameters are now controlled by their track. If, due to subsequent additions to the timeline, the playback position moves beyond the last keyframe on any track, then that track's parameter will be set to the value defined in the last keyframe - not the Reference Point.

There is another facet to the Reference Point. As well as containing values for all non-timelined parameters, it also contains a nominal position for those values. This position is used when inserting the first two keyframes for any new track. As explained above, tracks are only created when a difference is detected between the value of some parameter and the value that same parameter has in the Reference Point. When choosing to record that change in the timeline, those two values get a keyframe each. The position for the new value will be the current position of the timeline. The value from the Reference Point gets put into a keyframe at the position of the Reference Point.

The reference point automatically moves to the current position after every **{Insert Modify}**, and can also be moved manually when required. While appending keyframes to the end of the timeline, the system will keep the Reference Point's position updated sensibly, but when moving back to add a new track of keyframes it is important that the user starts by moving the Reference Point to the new starting point. Pressing **{Insert Modify}** when no parameters have been changed will always pull the reference point to the current position.

How the Reference Point Evolved

Traditionally, a timeline 'keyframe' contained an entire set of values for all of the parameters in a system. That entire set of values would always be applied to the system at the same time. One of the problems this causes is that there are many, many stored values that never change. If the user wants to change any of these constant values, that change must be propagated to all of the keyframes, making the technique of building up effects by layering changes on top of each other almost unbearable.

A keyframe in Kahuna (nearly always) only contains one value for one parameter. It is not tethered to a particular point in time just because some other parameter has a value at that point in time. Keyframes containing values for different parameters do not have to exist at the same point in time, nor must you have the same number of keyframes as any of the other parameters - they all exist independently of one another. Put simply, each parameter that changes gets its own track. Each track can have any number of keyframes on it, and they can be put wherever they are needed. Those keyframes can span any period of time within the timeline.

This keyframing system often brings up the question of how all the other parameters are controlled. Only a few parameters may change in the effect that is being timelined, but a significant number of other parameters were set up carefully to make the effect work correctly.

At the same time as keeping an eye on which parameters that are being changed, Kahuna is also keeping a snapshot of everything else. Whenever a timeline is loaded or run, it pushes all those remembered values in this snapshot back. This action returns all the parameters to the values they had when the timeline was recorded. This snapshot is called the 'Reference Point', and it plays an important role during the creation of the timeline, too.

Using The Reference Point

Generally, in order to create a timeline, the user must first set up the switcher in some starting state. To record that initial state, with Timeline Edit Enable switched on, press the **{Insert Modify}** button. This may seem like it creates the first keyframe, but it actually creates the Reference Point. This first button press informs the switcher of the timelines starting state - not only has no change yet been made, the switcher has no idea which parameter(s) you are about to change.

Once something is changed, the timeline **"Insert"** buttons light up red to indicate that change has been detected. Pressing **{Insert Modify}** then creates two keyframes for each changed parameter. The first contains the remembered value from the Reference Point, and the second is created from the new value.

The Reference Point is no longer responsible for remembering values of parameters that now have a timeline track. Those parameters are now controlled by their track. If the playback position moves beyond the last keyframe on any track, then that track's parameter will be set to the value defined in the last keyframe - not the Reference Point.

There is another facet to the Reference Point. As well as containing values for all non-timelined parameters, it also contains a nominal position for those values. This position is used when inserting the first two keyframes for any new track. As explained above, tracks are only created when a difference is detected between the value of some parameter and the value that same parameter has in the Reference Point. When you choose to record that change in the timeline, those two values get a keyframe each. The position for the new value will be the current position of the timeline. The value from the Reference Point gets put into a keyframe at the position of the Reference Point.

The reference point automatically moves to the current position after every **{Insert Modify}**, and can also be moved manually when required. While appending keyframes to the end of the timeline, the system will keep the Reference Point's position updated sensibly, but when moving back to add a new track of keyframes it is important to start by moving the Reference Point to the new starting point. Pressing **{Insert Modify}** when no parameters have been changed will always pull the reference point to the current position.

Reference Point Position Indicator

Each individual layer on the switcher has its own reference point position within the timeline. The position of each reference point is displayed at the Parameter level of the menu as a yellow diamond on the time scale. Normally, the reference point will be at the same point on all layers and modules.

Applying the Reference Point and Timeline Data

The reference point is "applied" (i.e. the snapshot is pushed back into the system) along with the timeline data, whenever the timeline current position begins to move. The current position can be moved in a number of ways including moving the current position manually via the current position knob on the GUI, pressing **{Goto Start}, {Goto End}, {Prev KF}, {Next KF}**, or by running the timeline.

Inhibiting the Reference Point

Sometimes there are situations during timeline editing and timeline playback where it is undesirable for the reference point to be continually pushed back into the system. For those situations, the **{Inhibit Ref}** function can be activated. Once on, only values generated by timeline tracks will be applied to the switcher. Not just that, but only the active regions of a track will be applied. The region between the first and last keyframe on a track is the active region.

The menu illustrates the inhibited reference point by not drawing a ghost of a constant span from the first and last keyframes to the ends of the timeline.

Loading and Saving Timelines

Saving timelines is almost the same as saving a regular snapshot DMEM, except that the 'Timeline' mode needs activating too. This can be done on the keypad with the '/' key. It can also be done from the DMEM/GMEM Content menu. The "Number Pad" menu shows a mock-up of the panel's VFD and clearly laid-out buttons for specifying what you want saved in your file. Within this menu, the button marked 'Timeline' (bottom-right) is used to tell the switcher whether or not to include timeline data in the saved file (regardless of whether you are saving a GMEM or a DMEM).
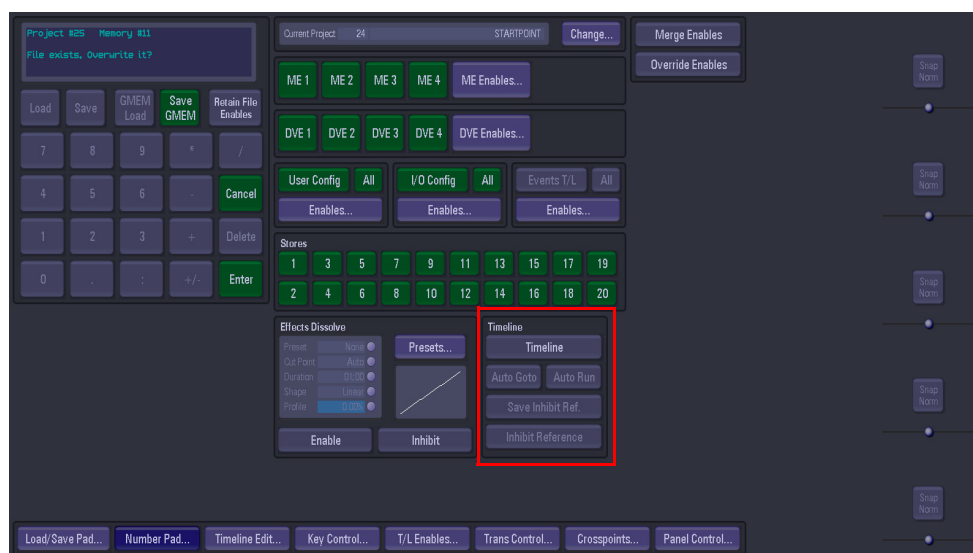
Inhibit Ref

As explained in the section about the **{Inhibit Ref}** button, there are some advanced ways of working that become possible when you inhibit the reference point. With that in mind, when saving a DMEM or GMEM you can choose whether or not the file also contains the current state of the **{Inhibit Ref}** button. If you choose to include it - by activating the 'Save Inhibit Ref' button - its state will be applied back to the switcher whenever the file is loaded. It is normally recommended to leave **{Inhibit Ref}** switched off, and not include it in any files you save unless you are absolutely sure you need it.

The Saved Reference Point

The reference point data that is saved in the DMEM/GMEM file is not a copy of the current reference point data; rather it is a copy of the current state of the system.

Therefore, if you save a DMEM/GMEM file containing a timeline with **{Auto Goto}** and **{Auto Run}** switched off, then later load that DMEM/GMEM file and immediately save it to another DMEM/GMEM file (without first playing or moving the timeline position in anyway), the new file will have different reference point data to the original file - reflecting any changes to the system set up that were made between the original save and the load. This is because the reference point loaded with the original file will not have been pushed back into the system by any change of timeline position.

What should the timeline do when loaded?

This is controlled by the state of two buttons in the timeline edit pad - **{Auto Goto}** and **{Auto Run}** - when the file is saved. By default, **{Auto Goto}** is on, but **{Auto Run}** is not. This gives the most commonly required behavior, which is that when the DMEM or GMEM containing the timeline is recalled, it asserts its values on the system (including all of those values in the reference point) at the position it was at when it was saved. The way that the DMEM applies a set of values when it is loaded, but does not start running, makes this mode behave much like a regular DMEM that does not contain a timeline. Generally, timelines are intended to be run from the start, so it is good practice to go to the start of the timeline before saving it. Double-pressing **{Goto Start}** will put move both the current position and the reference point at the start.

If **{Auto Goto}** is also switched off when the timeline is saved, then on loading nothing will appear to happen. This is sometimes useful when you are doing the load to cue-up an effect, and you want nothing in the switcher to change until you press **{Run}**. After the load, any change to the timeline position (this includes pressing 'RUN') will immediately apply all the timeline values into the switcher.

{Auto Run} simply tells the switcher to automatically run all of the tracks in the file once the load is complete.

> Note: The **{Inhibit Ref}** option will stay active until you either switch it off manually, or you load another timeline that has 'Save Inhibit Ref' on and **{Inhibit Ref}** off. If you load other timelines that expect to apply their reference point, but do not turn off **{Inhibit Ref}**, then you may experience unexpected behavior until **{Inhibit Ref}** is turned off.

> Note: Even with the **{Inhibit Ref}** options switched on, the Reference Point data will still be saved and loaded with the DMEM/GMEM file. The options just prevent the Reference Point from being asserted. If after loading the timeline the **{Inhibit Ref}** option is switched off via the button in the Timeline area of the panel, the reference point will then be asserted whenever the current timeline position is altered.

Force Keyframes into a Timeline

Pressing the **{Insert Prev}** and **{Insert Next}** buttons on the Timeline Edit keypad on the panel will force a new keyframe on all existing timeline tracks at the current position in the timeline (if none already exists at that position).

This can be particularly useful in Area Editing if the user does not want an area edit to affect the profile/interpolation of timelined parameters at the area boundaries - prior to an area edit the user can force keyframes at the area boundaries thus ensuring that the parameter values will remain unchanged at the specific time positions after the area edit has been implemented.

Timeline Menus

The Timeline Menus can be accessed by pressing the **{TIME LINE}** button on the GUI. The menus let the user visualize a timeline at all levels of the system (Modules (M/Es & DVEs), Transitions, Keyers, Backgrounds, etc., as well as individual parameters). The menus also allow the user to edit various properties of the timeline.

Timeline state after basic tutorial
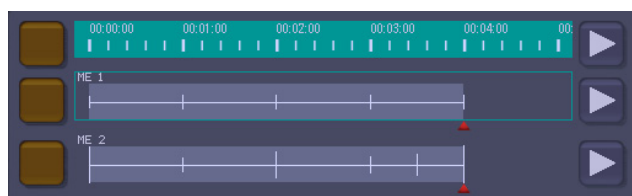
All menu's follow a basic layout, based on the standard Kahuna menu layout. The title bar at the top of the menu indicates which level of the Timeline menu the GUI is presently displaying. To the right of the menu are the standard Kahuna parameter controls, these vary depending on what level and mode the menu is currently in. At the bottom of the display are a number of control buttons, again these vary depending on the level and mode that the menu is currently in. The menu modes, their respective parameters and button controls are explained in more detail later.

The main display area of the menu consists of a time scale at the top with a number of timeline tracks below it. Tracks are only displayed for layers of the switcher where timeline data have been recorded. Each track has an enable button to the left and a run button to the right. The enable button enables (green) or disables (unlit) the level of the timeline that the track represents (e.g. M/E1, or KEY2). The enable buttons are interlinked with the enable buttons on the main panel.

At the Switcher and Module levels of the menu the 'play' buttons run (red) or stop (unlit) the timeline of the level that the track represents. At Parameter level the tracks do not have run buttons, as parameters cannot be run individually. Instead tracks have selection buttons to the right at Parameter level. Parameter tracks do have enable buttons which enable/disable the individual parameters.

The time scale also has an enable button and a run button. The scale's enable button enables or disables the entire level being displayed in the current menu. The scale's run button runs or stops the entire level currently displayed.

The menus have 3 main levels of display:
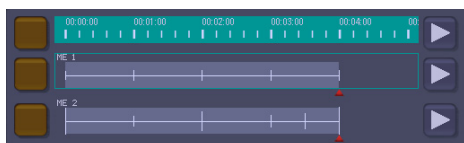
1. On first entering the menu the display is at the **Switcher Level** which displays summary tracks for all the modules on the connected switcher that contain timeline data.
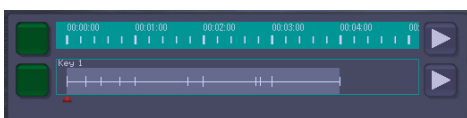
2. Double-tapping on any of the module summary tracks takes the user to the **Module Level** which displays tracks within the delegated module for all the layers that contain timeline data.
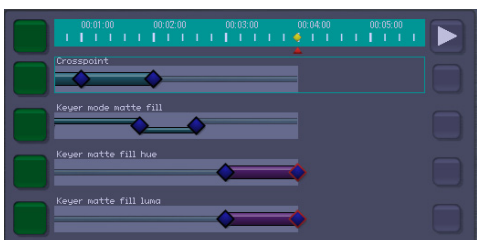
3. Double-tapping on any of the layer summary tracks takes the user to the **Parameter Level** which displays tracks for all the parameters on the delegated layer (e.g. M/E 2 Key 1, or M/E 2 Background A/B) that contain timeline data. This level displays detailed keyframe and span information, and provides the user with facilities to edit certain aspects of the timeline data.

Summary Tracks

Summary tracks represent a level containing one or more tracks of timelined parameters. Vertical lines (ticks) on the summary indicate time positions of keyframes within the tracks that are being summarized. The bigger the tick, the more keyframes at the given position. Horizontal lines indicate the time zone in which timeline data exists and where parameter changes will occur when the timeline is run.

Parameter Track Keyframes and Spans

At the Parameter Level the individual keyframes on each track are symbolized by blue triangles. Keyframes that are currently in line with the current position of the timeline are highlighted with a red border.

The keyframes are connected by color scan bars. Where the parameter that the track represents is a binary (i.e. on/off) value, the spans are narrow bars that indicate the value of the proceeding keyframe. If the span is below the center line, then the proceeding keyframe has a

value of 0, otherwise if it is above the center line then the proceeding keyframe has a value of 1. Before and after the active timeline area ghost spans are displayed - these indicate what value the parameter will be set to when the timelines current position is outside the active timeline area. Tracks for parameters that are more complex than binary have wide colored span bars between the keyframes. A centered, narrow span bar indicates that the values of the keyframes either side of the span are the same.

Basic Navigation

You can move up to higher levels of the menu (i.e. from the Parameter Level to the Module Level) by pressing the **UP [?]** button on the GUI.

To move down to lower levels (i.e. from the Module Level to the Parameter Level), double tap on the display area of the summary track that relates to the level they wish to zoom down to. The GUI will automatically delegate to the level selected. For example, to zoom from the Module Level menu for M/E 1 to the **Parameter Level** for M/E 1 Key 1 then the user must double-tap in the Module Level on the timeline summary track area for Key 1.

You can change between different layers at the same level (i.e. from M/E 1 Key 1 to M/E 1 Key 2 or from M/E 1 Key 1 to M/E 2 Key 1) using the delegate buttons on the GUI.

Pressing the **{TIME LINE}** button on the GUI will return the menu to the Switcher level.

Parameter Control Knobs and Buttons

Most of the parameter control knobs and buttons in the Timeline menus can be used for editing the timelines and are only available when timeline edit mode is switched on (using the **{Edit Enable}** button in Timeline Edit area on the control surface). Further explanation of most of these controls will be covered in the next section. Here we describe the 'Current Position' and 'Zoom' parameter controls.

At all levels, the top parameter controls the current position of the timeline. The current position can be moved anywhere - even beyond the end of the active part of any track, by using this parameter. Normally, the current position of all modules and layers follows the value on this parameter. The parameter control has a button titled 'Local Only'. When this button is lit green, the **Position** parameter only controls the current position of the currently selected or delegated module/layer. This can be useful under some circumstances, but would normally be switched off, so that any edits or new keyframes will remain synchronized between layers and modules.

At the summary levels, the zooming of the display is controlled automatically. This helps get a complete picture of the state of all the timeline tracks. At the **Parameter Level**, the zooming is controlled manually by the bottom **Zoom** parameter to facilitate detailed viewing and adjustments. When zoomed in at the parameter level, the display centers around the current position of the timeline layer being viewed.

Timeline Loops

Kahuna has two options for looping timelines in the form of Module Layer - **Play Counts** and individual **Track Loops**.

Module Layer Play Counts

The user may set a play count for each layer within a module displayed on the GUI via the "**play count**" parameter associated with the highlighted layer.
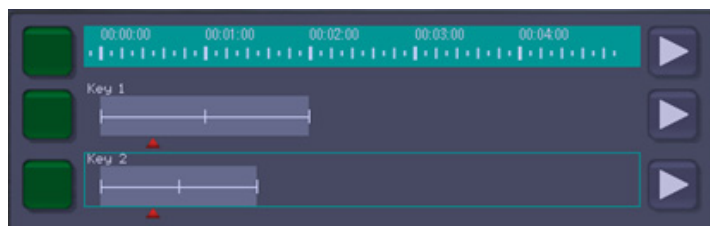
Highlighted module layers have an associated Play Count parameter control

The play count can be set between 0 and 100, where 0 means forever, 1 means play once, etc. Each layer that has a play count set to a value other than one will play to the end and then automatically jump back to the beginning of the timeline and play again, for the requested number of plays. Each jump from end to start is instantaneous and the timeline data within the layer will step from its end values to its start values without any interpolation between the values.

Whilst play loops are playing, the number of loops remaining will be displayed in the play button on the GUI for each looped layer - if the loop is set for ever, an infinity symbol will be displayed.

Play buttons indicate the number of play loops remaining on any looped layers

If the user stops play mid way through a loop count the current loop count for each layer is retained and pressing play will cause the play count to be continued. The user can reset the play count by moving the T-bar or selecting Goto Start or Goto End.

> Note: It is not possible to loop an either an entire module or the entire system as a whole from a single control. The user has to loop each layer individually. However it is possible to copy and paste the play count from layer to layer.

Play count also works in reverse play. If Flip-Flop is active on the looping layer, then each play in either direction counts as one play loop.

Timeline Track Loops

Timeline track loops enable the user to loop timeline data on individual data tracks and will step/curve/linear interpolate data as appropriate on each loop back.

Each data track has an associated Loop Count parameter via which the user can select a loop count for each track. If the count is set to 0 then the track will play only once. There is no "forever" setting for track loops. Up to 1000 loops can be selected for each track.
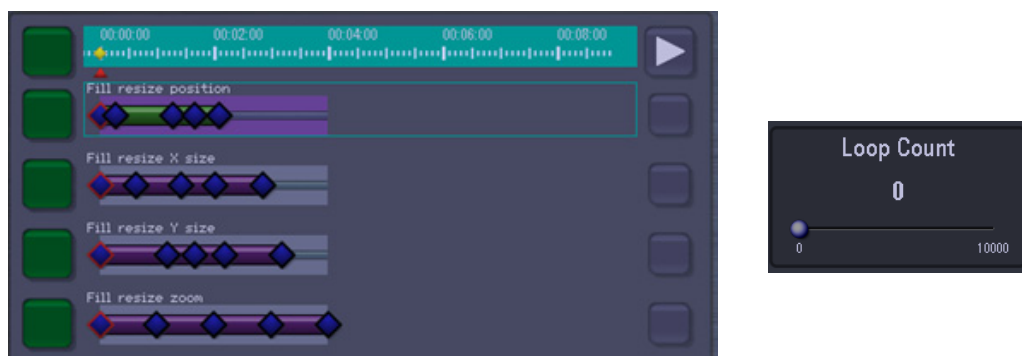
Each Timeline track has an associated Loop Count parameter

When a track has a loop count of greater than zero, the GUI will display a ghost of the track along the timeline for each loop set - this allows the user to visualize the Keyframes that will be implemented as the timeline is played. Note that if a group is looped, all the tracks within that group will loop in parallel.
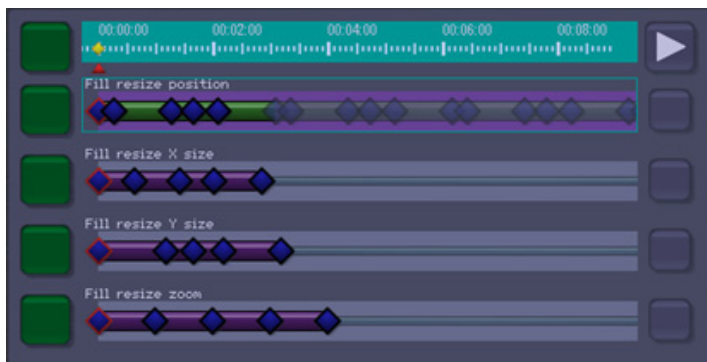
GUI displays ghost keyframes and spans on looped timeline tracks

When any tracks have loop counts set, the summary tracks at module and system level in the GUI will display ticks for all keyframes that are repeated in a loop, thus further aiding the user to visualize the keyframes that will be implemented as a timeline is played.

Summary tracks show ticks for all keyframes including those in loops

When a track loops, it step/curve/linear interpolates as appropriate between the last keyframe data of one loop and the first keyframe data of the next loop. The user can edit the time duration of this interpolation by selecting the span at the end of the actual track and editing it in the same way as other spans. This span is only accessible once looping is activated.
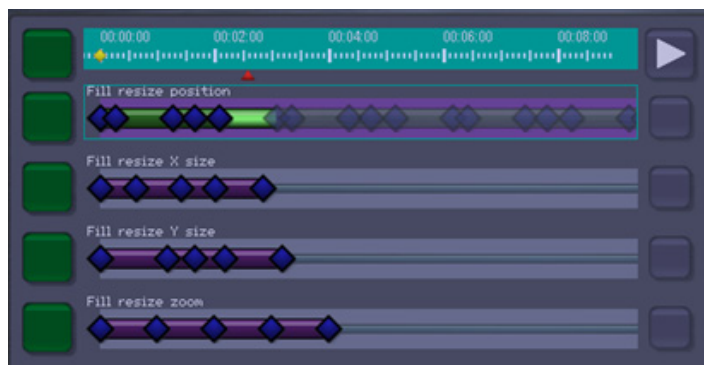
When looping, the span at the end of the track can be selected in order to edit its duration

The user can also edit the interpolation curve type between loops by selecting the last keyframe on the track and editing its parameters.

> Note: The ghost keyframes in the looped part of the track cannot be selected for editing. The user can only select the keyframes in the original track at the beginning of the timeline. Editing a keyframe on a track will similarly edit the associated ghost keyframe in each of the tracks loops.

Presently if the user inserts a new keyframe beyond the end of a looped track (but within the ghost area of a loop) the new keyframe will be added to the end of the original track, and each loop will be extended accordingly.

Current Position Cursors

Each Individual layer on a switcher (key, background etc.) has its own current position within a timeline. These current positions are indicated in the **Timeline** menus by red triangular cursors.

Module Track at Switcher Level shows cursors displaying Current Positions of different layers within the module

In the Switcher level menu, cursors are displayed under the module tracks. A cursor is displayed for each of the layers within the module represented by the track. The **Current Position** parameter will adjust the current position of all the layers within the highlighted module (adjusting the parameter will force all the layers in the module to the same position). If **Local Only** is off then all other current positions within the entire timeline will also follow the position of the parameter.

Layer Track in Module Level shows cursor displaying Current Position of the layer
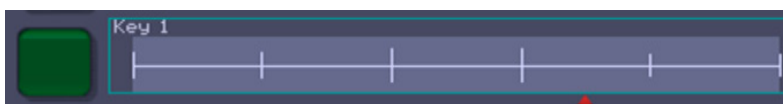
Similarly in the **Module Level** menu, cursors are displayed under the layer tracks, representing the current position of the associated level. The 'Current Position' parameter will adjust the current position of the highlighted layer.

Time Scale in Parameter Level shows cursor displaying Current Position and the Reference Point position of the layer
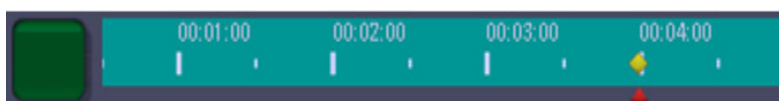
In the **Parameter Level** menu, a single cursor is displayed below the time scale, representing the current position of the delegated layer. The **Current Position** parameter will adjust the current position of the delegated layer.

You can play either all or individual parts of the timeline using the different run buttons within the timeline menus hierarchy. When in play the current positions cursors on the timeline menu move to indicate the time positions at which the timelines are being applied.

Reference Point Position Indicator

Each individual layer on the switcher has its own reference point position within the timeline. The position of each reference point is displayed at the Parameter level of the menu as a yellow diamond on the time scale. Normally, the reference point will be at the same point on all layers and modules.

> Note: Pressing the [PREV KF] and [NEXT KF] buttons together will move the reference point position to the nearest Keyframe.

Intermediate Tutorial

Using the timeline menu to edit the timeline

This tutorial continues on from the "basic" first one, so ensure that:

- The 'Edit Enable' button is lit green.
- If a timeline had been lost or deleted, the user will have loaded it back into the preferred M/E from the DMEM that was saved.

Navigate to the parameter level timeline menu and delegate the menu to the appropriate M/E and key-layer.

Parameter-level menu showing timeline created in the Basic Tutorial
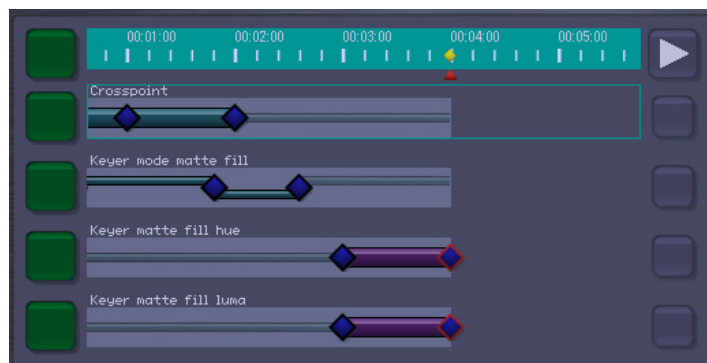
The menu shows tracks for all the parameters that changes had been made to when recording the timeline in the basic tutorial. Observe the **Yellow Diamond** at the end of the timeline. This is the Reference Point and was where the last keyframe was inserted. The first track is called **Crosspoint**. Its keyframes contain changes to the key-layer's crosspoint. The next track is called **Keyer mode matte fill.** It controls the key-layer's Matte Fill on/off switch. The first keyframe on this track sets the value to off (a state taken from the reference point at the time); the second is the record of the Matte Fill being turned on. The last two tracks shown contain the changing values for the key-layer's fill matte.

During the following steps, the GUI may automatically jump to a different menu to follow parameters that are being adjusting. Either navigate back to the timeline menu when this happens, or turn off the 'Menu Tracking' option in the 'GUI Preferences' menu.

38. Highlight any keyframe on the first track by touching it.

The highlighted keyframe lights up.

The current position jumps to the highlighted keyframe, so the keyframe also gains a red outline.

The **Keyframe Value** parameter attaches to that keyframes value.

Tutorial continuation:

37. Adjust the value on the parameter and observe the crosspoint changes live as the parameter is adjusted.

    If a crosspoint value is selected that matches the value on an adjacent keyframe, the span that connects them becomes thin to denote a constant-value region.

38. Set a different crosspoint for this keyframe.

    Sometimes it is easier to edit values in the timeline directly, rather than changing the parameter and then modifying the keyframe.

39. Highlight the second track by touching it while avoiding its keyframes and solid spans.

    The blue highlight box appears around the track.

40. Decrease the **Offset** of this track by around 0.5s.

    This will cause the Matte Fill to switch on sooner, which means the red color will be visible for 0.5s before the color starts to change.

41. Highlight the last keyframe on the last track.

42. Move the position of this keyframe to about 0.5s earlier.

    Notice that it is moved, it loses the red outline which was indicating alignment with the current position.

43. Run the timeline a few times to observe the changes.

    One of the crosspoints is now different.

    The red matte now stays red for 0.5s before it starts to change.

    Changes to one aspect of the matte color stop sooner than the other aspect(s).

44. Double-press **{Goto Start}**.

    *Double-pressing **{Goto Start}** causes **Current Position** and the **Reference Point** jump to the start of the timeline.*

    The second press must happen while the button is still lit up green.

    Once the Reference Point is aligned to the current position, the '{Insert Modify}' button lights up green rather than orange.

45. Move the current position to somewhere between the first two keyframes.

46. Turn on the key-layer's resize and press '{Insert Modify}'.

    This creates a new track which turns on the key-layer's resize at this point.

    *The **Reference Point** is automatically moved to this new position.*

47. Move forward to the end of the timeline (if **{Goto End}** is used, do not double-press it!)

48. Adjust the "**Resize Zoom**" down to shrink the tile.

49. Press {insert Modify} to add a keyframe at the current position.

    This creates a new track which reduces the size of the key-layer smoothly from where the resize is turned on to the end of the timeline.

    *This track begins at the position of the previous keyframe, because this is where the **Reference Point** was prior to this latest insert.*

50. Try running the timeline to see the effect of the newly layered tracks.

51. Use the **{Prev KF}** and **{Next KF}** buttons to move to the point where the resize turns on and the zoom-down starts.

52. Press '{insert Modify}'.

    This moves the **Reference Point** *here.*

    The '{insert Modify}' button changes from orange to green.

53. Move forward to the point where the key-layer's matte fill color change begins.

54. Adjust the position of the partly-zoomed-down tile, and press **{Insert Modify}** to create a new keyframe.

    Some parameters, like positional ones, will automatically group themselves.

55. Move to the end of the timeline.

56. Make another positional change to the key-layer and insert another keyframe.

57. Run the timeline.

Tutorial timeline now has additional tracks
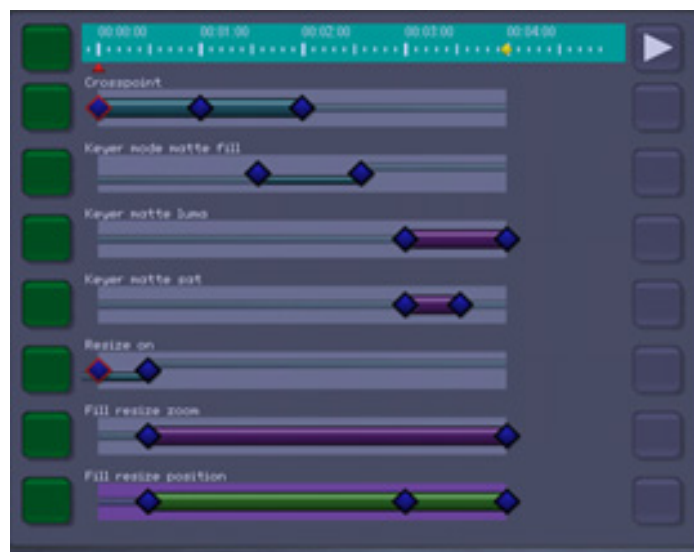
More Concepts

Timeline and System Hierarchy

The Kahuna systems data and behavior is broken down into a specific hierarchy which is closely reflected in the Timeline data and menus.

There are 3 main levels to the hierarchy. The top most level of the system is the Switcher level. A single switcher consists of a number of Modules (M/Es and DVEs). This is the second level of the hierarchy. Any one Switcher can have a combination of up to 6 modules of any type.

Each Module can be broken down into further layers which represent the 3rd level of hierarchy. For instance an M/E contains layers for each of its key buses, backgrounds, transitions, eKeys, Utils etc.

Key bus, backgrounds, transition layers etc. each contain numerous numbers of parameters many of which can be recorded in the Timeline. Timeline menus can each contain a number of tracks related to the parameters that have been timelined within the specific layer.

Outside of the switchers modules, the switcher has other parameters relating to user setup, macro events etc. In the timelines these layers of data are considered children of the switcher and thus sit on the 2nd level of the hierarchy. Macro Events are the exception to this rule in that modules can also have macro events associated with them, so Macro Events can exist on both the 2nd and 3rd level of the timelines hierarchy. Note that Auxes are part of the User setup data.

Enables

Each different level, layer and track within the system and timeline as described above has an Enable associated with it. An Enable controls whether the parameters within the specific level are relevant within the system and timeline, or not (outside of timelines, enables control what sections of data are saved and loaded into memory).

Each parameter track within a timeline has its own enable. These enables can only be switched on or off via the enable buttons to the left of the tracks in the timeline Parameter Level menus. When a parameter tracks enable is switched off (disabled) the timelined data for that parameter will not be applied when the timeline is navigated or played.

Each module layer (key bus, background etc) has its own enable. When a layer is disabled, no parameter changes within that layer will be recorded by the timeline, also none of the timelined data within that layer will be applied when the timeline is navigated or played, even if the individual parameter track enables are turned on.

Similarly each module (M/E, DVE, User etc) has its own enable. When a module is disabled, no parameter changes within that module will be recorded by the timeline, and none of the timelined data within that module will be applied when the timeline is navigated or played, even if the individual layers and parameter track enables are turned on.

Finally, the switcher also has an overall enable. When the switcher enable is turned off no changes within the switcher will be recorded in a timeline, and nothing in the timeline on that switcher will be applied.

Some enables can be switched on/off via buttons on the panel as well as buttons within the timeline menus, however due to the large number of possible enables in timelines, some can only be controlled via the timeline menus. Enables that are only controllable from within the timeline menus will only affect timeline operation.

Enable buttons on both the menus and the panels can be unlit, green or orange. Unlit indicates that the enable is turned off. Green indicates that the enable and all enables below it are turned on. Orange indicates that the enable is turned on but only some, not all of the enables below it are turned on.

The enable action in Kahuna timelines is instantaneous, so if a level or track is disabled during timeline playback, no further parameter changes will be applied to newly disabled data. Similarly if enables are turned on during playback, timeline data for the newly enabled parameters will be applied immediately.

The enable buttons will light up orange when the relevant enable is turned on but some enables below the relevant enable are turned off (in the same way as the enable buttons on the panel).

Additionally (unlike panel enable buttons) the enable buttons on the timeline menus will light up red if the relevant enable is turned on but an enable above it is turned off. i.e. if M/E1/Key1 enable is on, but M/E1 enable is off, the M/E1/Key1 enable button will be lamped red.

Understanding Interpolation Profiles

Keyframes define parameter values at specific points in time. Interpolation is the process of generating values to use in the gaps between those keyframes.

Step Interpolation

The simplest interpolation mode is called **Step**, and can be thought of as no interpolation. When a keyframe is set to **Step** interpolation, the value it contains is used everywhere in the span that follows it. When the next keyframe is reached, the value will jump - or step - to the one stored in that keyframe. Though simple, this type of interpolation is used by default for a large number of parameters in Kahuna. Not only is it the only logical choice for parameters that turn things on or off, it is used for a number of things that don't have any in-between state. For example, a crosspoint track might be setting crosspoint 3 in one keyframe and crosspoint 10 in the next. It would certainly not be right for the timeline to walk through crosspoints 4 through 9 on the way!

Linear Interpolation

Almost all of the other parameters in the system (those that have continuous values) use **Linear** interpolation. One way of visualizing linear interpolation is to imagine a bar-chart. Each bar is a keyframe, and the value in each keyframe is represented by the height of the bar. Linear interpolation draws a straight line between the top of each bar to come up with a value to use in between the keyframes. For almost all parameters, the 'look' this gives is completely natural, but there are a few parameters that require something a bit cleverer.

Curve Interpolation

The human eye has certain expectations when it comes to the movement of objects. Things in the real world have momentum. They do not instantly jump from one position to another. Nor, when they start moving, do they immediately attain a constant speed and then stop dead when they have reached their destination. Real objects accelerate and decelerate. They follow a curved path when they change direction.

So, parameters that control the movement of visual elements - things like DVE tiles, wipe shapes, and resized key-layers - are given a **Curve Profile**. The curve profile has three parameters which affect the character of the move. These parameters are **Tension**, **Continuity** and **Bias**, and have been used in keyframing for many years. With their default values they produce pleasing, natural looking movement.

The best way to get an understanding of how these three parameters affect the path a moving element is by creating and running a simple timelines with 3 or 4 keyframes and adjusting each parameter to the same value on each keyframe. Different values for each parameter can be used, on each keyframe, on each track. To help get an idea of what to expect, below is a description of what each parameter does.

Continuity

Continuity is the simplest to understand, though it might be better thought of as "Discontinuity". The default value of zero gives a smooth (continuous), non-exaggerated path that swings out at corners to prevent any sudden change of direction. As it is increased beyond 1, it exaggerates the outward swing to the point where it seems to overshoot, only to return to the position in the keyframe purely to bounce off it.

A value of -1 is also significant. This reduces the outward swing of the path to the point where it becomes a straight-line to the next keyframe, where it abruptly changes direction towards the next - just like the linear profile. Decreasing further gives an inward swing followed by a bounce at the keyframes. Note the further this parameter is taken from zero, the stronger the discontinuity.

Tension

An analogy that partially works for illustrating how the path is affected by tension is by imagining the path is described by a piece of springy wire - like a guitar string - looped through pegs in a pegboard. The pegs represent the positions that the keyframes define. At zero, the string is not floppy, nor is it under tension. As the tension increases the wire is tightened around the pegs until the tension value reaches 1. Though this creates the same linear path as a continuity setting of -1, the motion is more natural. It accelerates out of one keyframe and decelerates as it approaches the next. Continuing in a positive direction, the analogy stops working here - the path starts bending inwards. Going negative, the pegboard and guitar string analogy holds up to some extent. As more slack wire is pushed onto the board, it becomes more bowed. However, below about -2, the wire seems to acquire stiffness around the pegs.

Bias

Bias changes the angle that the path takes through the keyframe. Zero makes the arrival and departure angles symmetrical, positive values rotate the approach angle inside the corner and negative values pull it outside.

> Note: There are some interesting (and often hard-to-predict) interactions between these parameters! With extreme values, generally the path becomes very loopy.

Constant Speed vs. Constant Path

Another important contribution to the look of a timeline that moves something around the screen is changes to the speed of the movement. Imagine (or create) a timeline that moves a resized key-layer around the screen. The keyframes are all one second apart, but between some of the keyframes the key-layer is moved only a tiny amount and between others it is moved much more. The result is that the movement speeds up and slows down because sometimes the tile has half a screen to move across in one second, and sometimes it needs to move only a few pixels in one second. This abrupt speed change can appear just as jarring as sudden changes in direction. Ideally, keyframe durations should be considered during timeline creation. Where this is not done, the **Keyframe Position** (that is the keyframes time position within the timeline) can be changed quite simply in the timeline menu, so the smaller movements can be given shorter durations, and thus the speed of the tile along it's path remains more constant.

It is also possible to get Kahuna to solve this speed-changing problem, but at a price. To set the highlighted track to work in this mode, press the **{Path}** button. This causes a deviation of the normal path where it is necessary to achieve a constant speed going through the keyframe. A label appears on the track that says **Durations Affect Curved Paths**. This could be considered a warning. Any changes to curve-keyframe durations on this track will now cause the path to change (often only subtle changes). This may or may not be important - depending on the circumstance.

Understanding Smooth Spans

Sometimes when moving visual elements around the screen, the motion can seem to start and end rather sharply - even with curve motion. Kahuna has a **Smooth** setting that can be applied to any **Curve** or **Linear** span. 'Smooth' can be applied over a multi-keyframe movement, or on a simple 2-keyframe pullback. On the span following the first keyframe of the movement, set **Smooth** to **Begin**. On the span that leads up to the final keyframe of the move, set **Smooth** to **End.** Or, for 2-keyframe sections, set the span that joins the two keyframes to **S Linear** (this is an abbreviation of "Smooth Linear"). This gives a smooth start out of the first keyframe and a smooth arrival at the second.

> Note: That this smooth setting stops the regular curve interpolation - but given that the user only has two keyframes, where's the curve meant to be?

Overriding Default Profiles

It is not possible to 'upgrade' any parameters that would naturally use 'step' interpolation to use either of the other interpolation modes. Also, 'Step' interpolation is incompatible with smooth spans. For any parameters that default to either linear and curve interpolation, it is possible to change the keyframe profiles. Note that the default profiles have been chosen carefully, and promoting a linear parameter can have an undesirable effect. Curve interpolation is able to push values beyond their bounds. Under such circumstances those values are clipped, which ruins any smooth look that was (presumably) sought.

Groups

Groups are a collection of two or more parameters that are grouped together and displayed as a single track in the timeline menus. Groups are designed to synchronize tightly related parameters. In particular parameters that need to follow related curved paths. Unlike standard parameter tracks that follow the partial keyframing concept, in grouped tracks all parameters have keyframes at the same positions. Hence inserting a keyframe caused by a change in just one parameter within a group will force keyframes to be created at the new position for ALL parameters within the group. This forces the grouped parameters to have synchronized movement between value changes.

Grouping is generally designed to be an automatic system, where Kahuna will automatically group closely related parameters that need to follow curved behavior - for instance sizing and positioning parameters. A facility is provided to group and ungroup parameters by the user (a 'Manual grouping' option can be switched on via the Timeline Defaults menu), however it is not envisaged that there will be many occasions when the user will need to group or ungroup parameters in this way. It is important to note that when manually grouping parameters, new keyframes may be forced into the parameter timelines to ensure that all the parameters within the group have concurrent keyframes.

In the Timeline Parameter Level menus group tracks are distinguished from regular tracks by having a purple background (regular tracks have a grey background).

Editing Timelines Using the GUI

The Timeline menus have a number of edit modes depending on what elements are currently highlighted or selected on the active menu. You can only edit timelines when 'Edit Enable' is turned on in the Timeline Edit keypad on the panel.

Parameter Controls

The Parameter Controls to the right of the menu can be used to adjust individual timelined parameter properties.

Control Buttons

The control buttons at the bottom of the menu have actions that can affect individual or multiple tracks, or the entire layer displayed in the current menu.

The top row of control buttons is only available at the Parameter Level menus. These buttons relate to actions that can be performed on a highlighted or selected track.

At Parameter level, at the right hand side of the button area there are an up arrow button and a down arrow button. These buttons can be used to move the position of the current highlighted track within the displays track list. These buttons can be used to place tracks of interest closer together to ease visualization.

The bottom row of buttons is available at all levels of the menu. These buttons perform actions relevant to the level being displayed in the menu. These buttons allow the user to enable/disable **Flip Flop** play for the current level, enable/disable Reverse play on the current layer, insert Pauses on the current level and insert macros on the current level.

Highlighting Tracks - viewing and editing

At all levels within the Timeline menus, tracks may be highlighted when in **Edit Enable** mode.

Only one track can be highlighted at any one time - the highlighted track is indicated by a light blue box around the track.

The "Crosspoint" track is the highlighted track
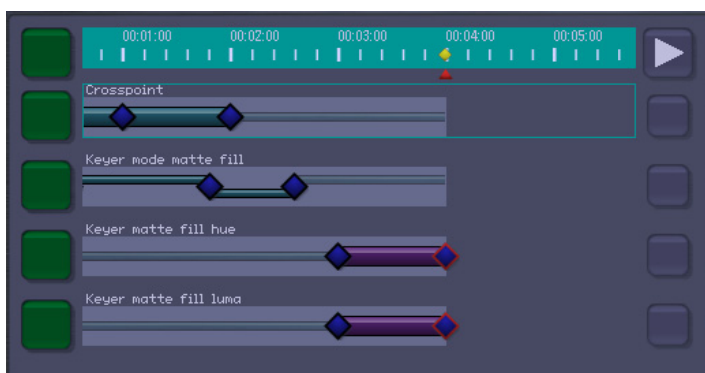
The highlight indicates which track is associated with the parameter controls and the active menu control buttons. The highlight corresponds with the track selected by the **Track** parameter second down on the right of the menu. Adjusting the **Track** parameter changes which track is highlighted. The highlight can also be moved by a single touch on the display area of another track.

'Offset' Parameter

The middle 'Offset' parameter allows the user to edit the offset of the highlighted track. The offset of a track (be it a parameter track or a module or layer level summary track) relates to the position of the first keyframe(s) timelined on the highlighted parameter, layer or module. Adjusting the offset of a track adjust the position of ALL the keyframes within that track, moving them either left or right in relation to the time scale.

'Rename' Button

At Parameter Level the user can rename a track by pressing the **{Rename}** button, this opens a QWERTY pop-up where the user can edit the track name. This feature can also be instigated by double tapping on the name of the track on the GUI. Names automatically given to parameters by the Kahuna system may not descriptive enough. The user can therefore use this facility to give parameters names that are more useful/understandable.

'Path' Button

The **{Path}** button can be used to switch the Path option on or off for the Track. The path option is related to how a parameter is interpreted between keyframes.

Selected Tracks - Editing Multiple Tracks

In the Parameter Level of the menu Tracks can be selected by pressing the selection button to the right of the track display. When a track is selected its selection button lights green with an 'S' displayed.

"Keyer Matte Hue", "Keyer Matte Luma" Keyer Matte Sat" tracks are selected
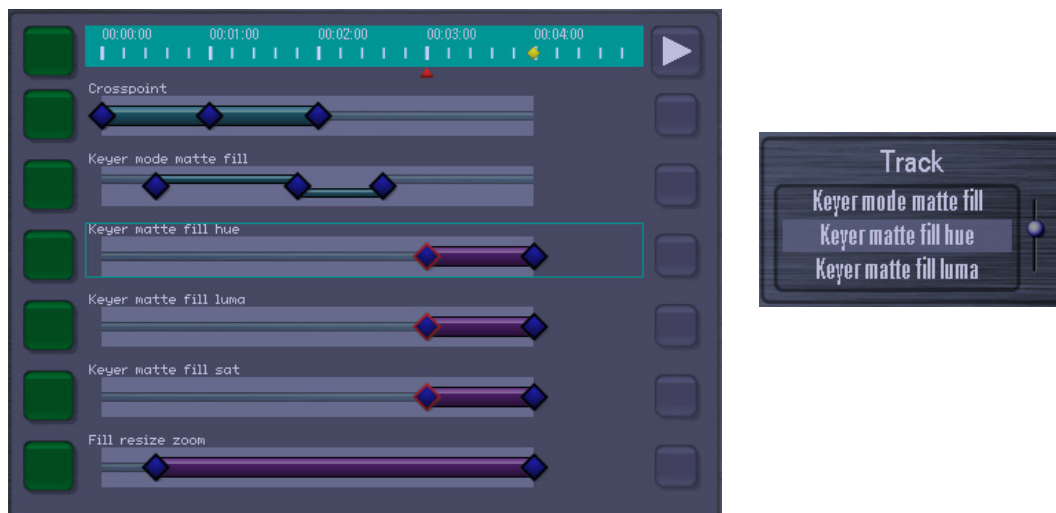
'Group' Button - (Only available if Option switched on in User Preferences (Timeline Defaults)

When two or more parameter tracks are selected the **{Group}** button becomes activated. Pressing this button will combine the selected tracks into a group. If one or more selected tracks are already groups then the 'Group' button will light up green. Pressing the green 'Group' button will ungroup the selected group tracks. Generally speaking, it is not recommended that the user manually creates or decompose groups.

'Delete Tracks' Button

When one or more tracks are selected at the parameter level, the **{Delete Tracks}** button becomes activated. Pressing this button will delete all the selected tracks from the timeline.

Selected Keyframe - viewing and editing individual Keyframes

At Parameter Level, by pressing on a Keyframe on the display, the user can highlight an individual Keyframe in order to view and edit that Keyframes properties. The highlighted Keyframe lights up in the display.

A Keyframe has been selected for editing
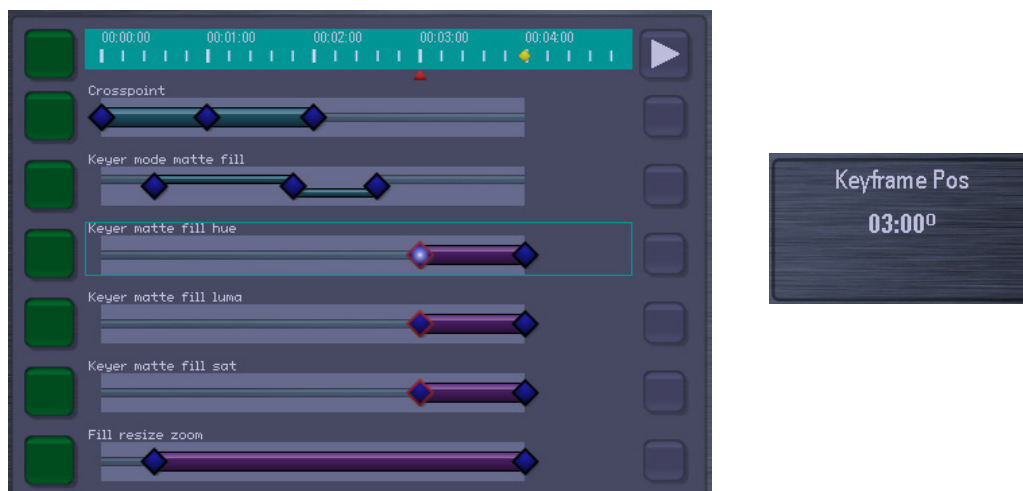
Once a Keyframe is highlighted the parameter control and button controls on the display change to allow the user to edit Keyframe specific properties. The user can press the selected Keyframe on the screen to de-select it and go back to track editing.

General Keyframe Editing

'Keyframe Pos' Parameter

The **{Keyframe Pos}** parameter allows the user to adjust the time position of the highlighted Keyframe.

> Note: The allowable position of the Keyframe is bound by it neighboring Keyframes - a Keyframe cannot be moved to a position before its previous Keyframe or after its next Keyframe. Neither can Keyframes be moved to a negative time position.

'Profile' Parameter

The profile of a Keyframe is related to how a parameter is interpolated between Keyframes. Possible profiles are "Step", "Linear" and "Curve". Note that some parameters are limited in what type of profile they can have. For instance, simple bit field parameters can only have a step profile and for these types of parameters this parameter will not be available.

'Keyframe Value' Parameter

This parameter control allows the user to edit the value of the parameter at the specific Keyframe position, thus altering the timelined data. Changes made with this parameter are dynamic so it is possible to view these changes as they are applied so that the desired effect can be achieved in relation to other parameters.

'Delete KF' Button

Pressing the **{Delete KF}** button at the bottom of the menu will delete the selected keyframe.

> Note: Deleting a keyframe has no effect on the position of remaining keyframes on the track.

The duration of the keyframe previous to the deleted keyframe will be extended to the position of the next keyframe, leaving all remaining keyframes in their existing positions.

'Curve' Button

This button is grayed out unless the keyframes profile is set to **Curve**. When the keyframe profile is set to curve then pressing this buttons changes the parameter selection to allow the user to edit the curve profile properties for the keyframe.

Editing the Curve Properties of a Keyframe
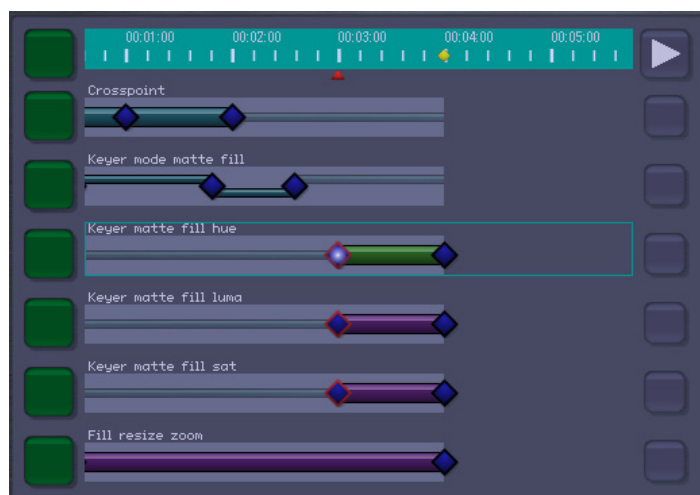
Keyframe Curve Editing

'Tension' Parameter

This Parameter adjusts the keyframe profiles tension property.

'Continuity' Parameter

This Parameter adjusts the keyframe profiles continuity property.

'Bias' Parameter

This Parameter adjusts the keyframe profiles bias property.

You can return to the other Keyframe edit controls by pressing the **{General}** button. You can press the selected Keyframe on the screen to de-select it and go back to track editing.

Span Color

> Note: Spans have a different color depending on the Profile of their leading Keyframe:

Spans that are blue have a step profile:


Spans that are purple have a linear profile:

Spans that are green have a curved profile:

Editing Selected Span

At Parameter Level, by pressing on an individual span (the bar that connects 2 keyframes) on the display, the user can highlight the span in order to view and edit that span's properties. The highlighted span lights up in the display.

A span has been selected for editing
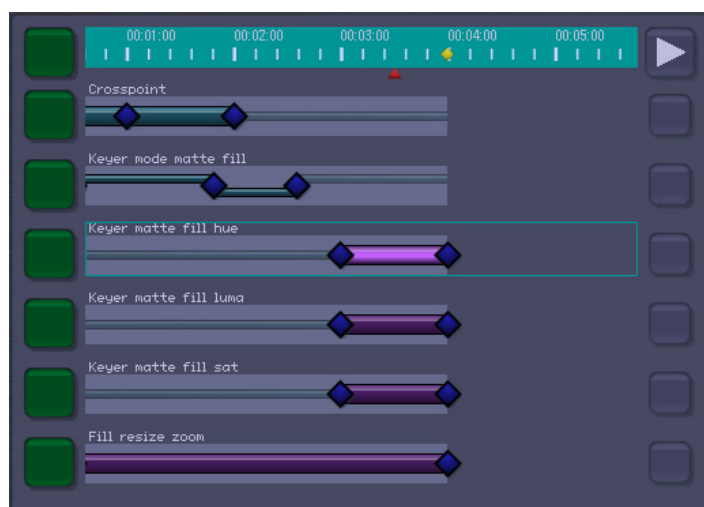
When a span is selected the parameters change, allowing the user to edit span specific properties. Press the selected span on the screen to de-select it and go back to track editing.

'Duration' Parameter

Using this parameter the user can adjust the duration of the span. Adjusting span duration moves all the keyframes to the right of the span, keeping the duration of the spans between the moved keyframes constant.

'Smooth' Parameter

The smooth parameter adjusts how any smoothing effect is applied to the interpolation of data between the keyframes either side of the span. Smoothness can be switched off, applied to the start of the span, applied the end of the span, or applied linearly across the entire span.

Consequences of Selecting Keyframes or Spans

Selecting a keyframe or span moves the track highlight to the track that contains the selected keyframe or span. It also moves the current position of the timeline (or just the displayed layer if **Local Only** is switched on). When a keyframe is selected the current position is moved to the position of the selected keyframe. When a span is selected the current position moves to the center position of the span.

Undoing Edits

Any of the edits described above can be undone by pressing the **{Undo}** button on the GUI if the button lights up orange after the edit.

Deleting Timelines

Entire timelines can be deleted using the **{Delete All}** button in the **Timeline Edit** area on the control surface. It is important to note that this function cannot be undone. Once a timeline has been deleted it can only be retrieved if it has been saved to either a DMEM or GMEM.

A single press of the **{Delete All}** button causes the button to light green, but has no other effect. A second press of the button whilst it is still green will cause all enabled sections of a timeline to be deleted and the button will light up red. A third press of the button whilst it is still red will cause all remaining (disabled) sections of the timeline to be deleted.

Changing Total Duration of Timeline

The total duration of the entire timeline can be changed using the **Total Time** button in the **Timeline Edit** buttons on the control surface. Pressing the **{Total Time}** button activates the keypad on the panel and also a keypad dialog on the GUI. Using either of these keypads will enter a new total time value that can be applied to all the enabled parts of the existing timeline.

On applying a new total time all times within the timeline (track offsets, keyframe positions, current positions, reference point positions etc) will be altered by the same ratio. For instance, if the total time is changed from 04:00 to 08:00, all times within the timeline will be multiplied by a factor of 2. If the total time is changed from 4:00 to 2:00, all times in the timeline will be divided by a factor of 2.

User Parameters

User parameters that can be recorded within a timeline are placed in the **User Parameter** layer which is a child of the up-most switcher level and hence a sibling level to the M/Es and DVEs. The User parameter layer can be accessed from the Switcher level timeline menu.

User Parameters level is a child of the Switcher level
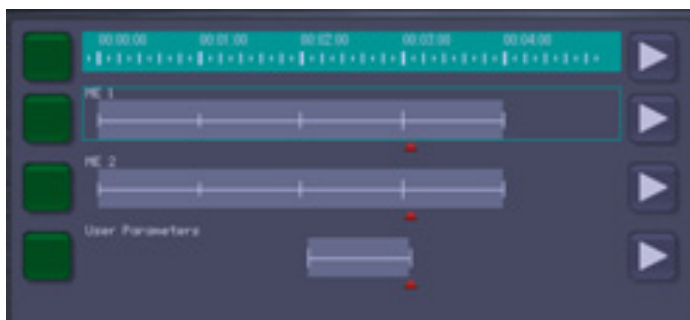
Double tapping on the **User Parameters** track on the Switcher Level changes to the Parameter Level menu for the User Parameters on the timeline. These User Parameter tracks and keyframes can be viewed and edited in the same way as other timeline parameters.

The User Parameter Timeline Menu
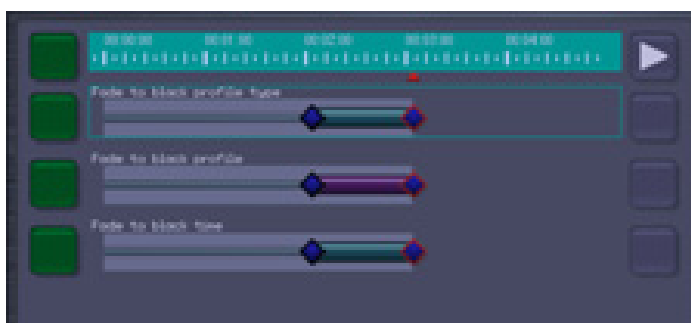
Advanced Tutorial

Creating a transition timeline using Enables

This describes how to build an effect on one M/E that mixes on a key-layer, and then does a background transition using a wipe.

58. Once **Edit Enable** is active, begin by triple-pressing the **{Delete All}** button to clear all the timeline tracks.

    The third press also deletes everything that was not enabled.

59. Turn off all top-level enables using the buttons on the right of the **Timeline Edit** buttons.

60. Turn on just your chosen M/E.

61. On that M/E's set of enable buttons, turn off everything except **TRANS**

    The M/E's enable button within the timeline edit pad goes orange to indicate that some part of that M/E is not enabled.

62. In the **Transition Control** area, turn off any key-layers that might be on, and then select **[MIX]** and put just **[KEY 1]** in the transition.

63. Choose crosspoints for Background A and B, and choose a keyed graphic for the key-layer.

64. Press {Insert Modify}.

    This sets the start state for the timeline in the reference point.

65. Navigate to the timeline menu.

    It is still empty, as keyframes have yet to be added - only the reference point.

66. Using the parameter control or the keypad, set the 'Current Pos' to 2s.

    This sets the position ready for the first keyframe.

67. Press Auto on the M/E and wait for the transition to complete.

    *Observe that the three **INSERT** buttons light up green showing the transition has been detected.*

68. Press {Insert Modify}.

69. Move the current position forward by 1 frame by holding the **{Snap Norm}** button and entering "+1" in the keypad.

70. Change the transition type to **[WIPE]** and set **[BGND]** to be the next transition.

71. Press {Insert Modify}.

72. Move the current position forward by 1s by holding the **{Snap Norm}** button and entering "+1:" in the keypad.

    The colon after the '1' tells the system that seconds are being added, not frames.

    *Run the transition (using **[AUTO]** or the transition T-Bar), and not the timeline.*

73. Press {Insert Modify}.

74. Now use the main T-Bar to move back and forth through the timeline.

75. Try changing the crosspoints and run the effect again.

Note: The crosspoints are not changed back by the timeline because the backgrounds and key-layers are not enabled, so are not being timelined.

Advanced Timeline Features

Adding Macros to Timelines

Macros can be inserted into the timeline at both the switcher and the Module level. Pressing the 'Macros…' button at the base of the Switcher or Module level menus changes to the 'Insert Macros' menu.

Insert Macros Menu
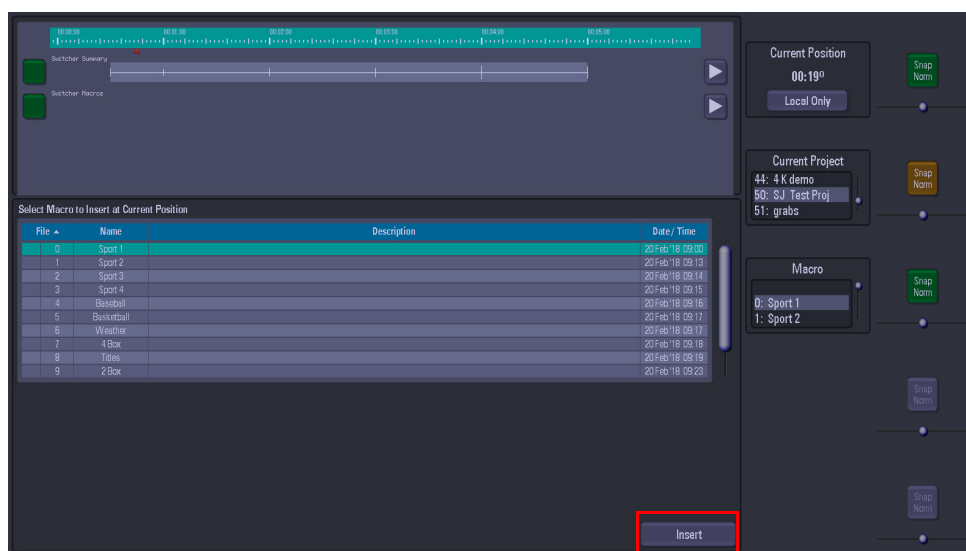
The 'Insert Macros' menu displays a short version of the track display with a time scale and two tracks. The first track is the summary track for the level where the macros are to be inserted (Switcher or Module). The second track displays a summary of the macros that are timelined at that level.

Below the tracks is a file selection table from which the user can select which macro to insert. The **Project** parameter on the right of the menu allows the user to select which project the table is displaying. The required macro from the project can be selected either by use of the Macro parameter, or by tapping on the required macro in the table.

The **Current Position** parameter allows the user to select the time at which the macro is to be inserted. Adjusting the parameter has the same effect as adjusting the current position parameter on other levels of the timeline menu. It will adjust the current position of all levels within the timeline, unless the **{Local Only}** button is activated, in which case it will just adjust the current position of the current level.

To insert the selected Macro at the current position press the **{INSERT}** button at the base of the menu. A tick will appear on the Macro track to indicate that a macro keyframe has been inserted at the selected position. Any number of macros may be inserted into the timeline, and any individual macro can be inserted at multiple positions.
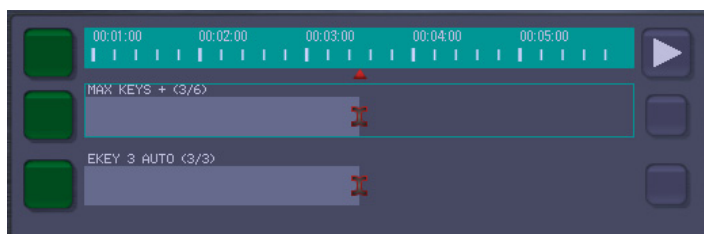
Pressing the up arrow on the GUI will go back to the summary menu for the current level. This menu will now display a summary track for the levels macros.

Summary level containing Macro Track
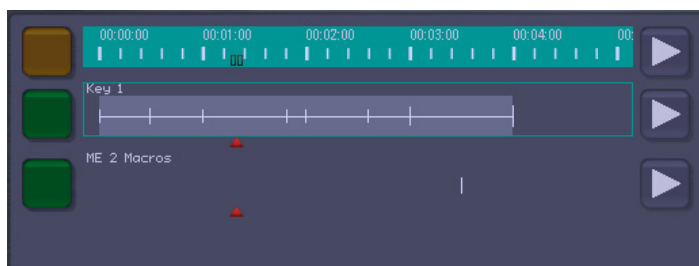
By double tapping on the macro track either in the summary menu or in the **Insert Macro** menu, will open the **Macro Edit** menu for the current level.

Macro Edit Menu

The **Macro Edit** menu is similar to the parameter edit menu in that tracks can be highlighted and selected in order to edit their offsets or delete unwanted tracks. However the display of keyframes within this menu is slightly different from the parameter menu. Each macro keyframe is represented by an icon that indicates the direction in which the macro is fired. Also, unlike in parameter menus, there are no spans between the individual keyframes.

When a **Macro Keyframe** is selected its icon lights up and the control knobs and buttons relevant to Macro keyframe editing are activated, allowing the Macro properties to be edited:

Macro Position Parameter

This is similar to the **KF Position** Parameter in the parameter menu. It allows the user to adjust the time position of the selected macro keyframe. As with parameter keyframes the position of a macro keyframe is limited by the positions of its neighboring keyframes.

Direction Parameter

This parameter allows the user to edit the direction in which the macro will be fired. The macro can be fired only when the timeline is running in forward direction, only running in backward direction or running in both directions. The keyframe icon changes with this property to indicate the direction that has been set.

Delete KF Button

Pressing this button will delete the selected macro keyframe.

As with the **Parameter** menu, editing done in the **Macro** menu can be undone by pressing the **[UNDO]** button on the GUI if the button is lit.

Adding Pauses to Timelines

It is possible to add pauses to each of the levels of the timeline from the timeline menus. Pauses will suspend playback at the specified time of everything within the layer on which the pause is applied. Playback can be resumed by repressing the play button for the relevant level or the play button for a level higher up in the hierarchy of the timeline.

To insert a pause at the current displayed level move the current position to the required time and press the **{Insert Pause}** button at the bottom of the menu. Pauses can only be inserted when **Edit Enable** is turned on.

Module Level menu displaying pauses
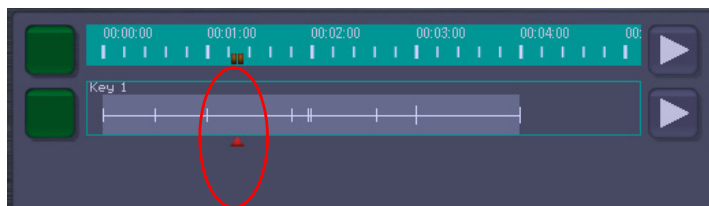
Pause positions are displayed on the menu at the relevant level by an orange pause symbol on the scale bar. Pauses at a higher level of the timeline (that will affect the level being displayed) are indicated on the menu by a dark grey vertical line on the scale bar.

Module Level pause selected for editing
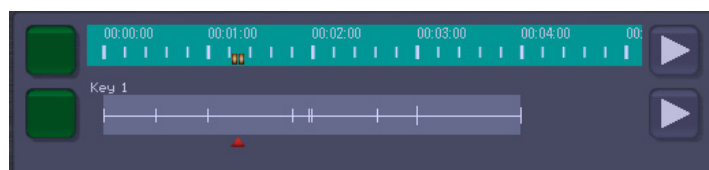
You can select a pause on the active level of the menu by pressing on the pause symbol on the scale bar. The selected pause becomes highlighted and relevant control knobs and buttons are activated for editing the pause:

Pause Position Parameter

You can edit the time position of the pause using this Parameter.

Delete Pause Button

You can delete the selected pause by pressing this button.

> Note: Remember that you have to be in the menu for the level on which the pause belongs in order to edit a specific pause.

Keyframe Position

This area edit is only applied to selected tracks on the layer displayed on the GUI.   The active area is the area that contains the selected keyframe. The track selection buttons will light blue to indicate that a knob adjustment may affect all keyframes on the selected track that fall within the area.
Any moves to the selected keyframe position (using the KF Position knob) will also be applied to the other keyframes within the area on the selected tracks. The movement is restricted such that none of the keyframes in the area can move beyond the boundaries of the area (except when the boundary is the end of the timeline, in which case moves to the right are un-bounded).

Bookmarking Timelines

You can add bookmarks to a timeline in order to aid navigation to specific time positions within the timeline. Bookmarks can only be inserted from the parameter level menu (as this levels zooming ability facilitates more accurate time adjustments). However bookmarks are displayed and available for navigation from all levels of the timeline menus.

Bookmark has been inserted on Timeline
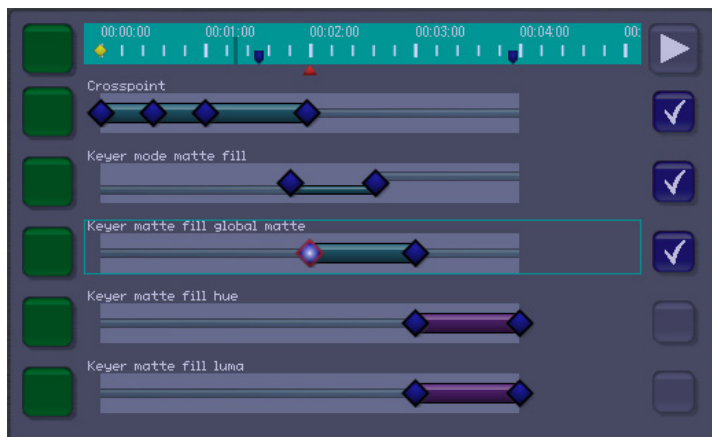
To insert a bookmark, within the parameter level of the menu move the current time to the desired position and press the **{Ins Mark}** button at the bottom of the menu. Once inserted the bookmark is indicated on the display by a blue arrow mark on the scale bar.

When the current position is in line with a bookmark at the parameter level, the **Ins Mark** button lights up green. Pressing the button when it is green will delete the bookmark that is at the current position.

If the Mark and Pause markers are hollow, this indicates when bookmarks and pauses are disabled (displayed on the scale bar on the menu). The graphics are "ghosts" of the full enabled graphics.

Events Enables have been extended (where the macro enables are located) to include bookmarks and pauses.

> Note: Note that bookmark enables are only at system level, pause enables are at system and module level.
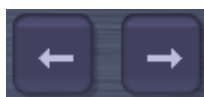

These buttons at the bottom of the menu move the selector left or right through the keyframes and spans on a track. This is particularly useful when keyframes are tightly packed and overlapping on the screen thus making it hard to select a specific keyframe/span manually.

Ripple Modify

This area edit is only applied to selected tracks on the layer displayed on the GUI. The active area is the area that contains either a selected keyframe OR the center of a selected span. The track selection buttons will light blue with a "tick" in them to indicate that a knob adjustment may affect all keyframes on the selected track that fall within the area.

Any changes made to the following variables (using the relevant knobs) on the selected keyframe or span will also be applied to other keyframes and spans within the selected edit area on selected tracks: Profile, Tension, Continuity, Bias, Smooth.

> Note: If an {Ins Mark} is placed before and after a number of keyframes in a timeline track, touch the first keyframe between the markers and then press the track selection button. (will light blue with a "tick") Then adjust the Profile parameter to a different profile, then all the keyframes between the inserted marks will have the same profile.
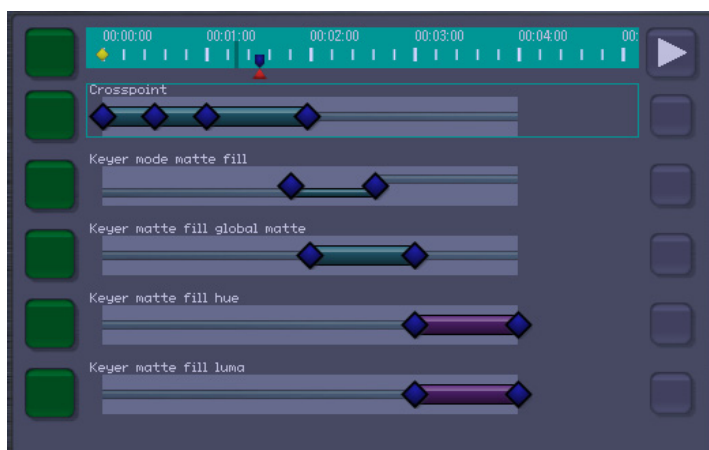
Keyframe Spread

This area edit is only applied to selected tracks on the layer displayed on the GUI. The active area is the area which the layers current position falls.

Pressing the KF Spread button on the GUI will cause all the keyframes within the area on each selected track to be distributed evenly within the area.

Snap

This is not an area specific function. However it only applies to selected tracks on the layer displayed on the GUI.

Pressing the Snap button on the GUI will cause the keyframe on a selected track that is nearest the current position to move to the current position. If 2 keyframes are equidistant from the current position then neither will snap.

Snap to KF

This is not an area specific function. However it only applies to selected tracks on the layer displayed on the GUI.

When a Keyframe is selected, pressing the snap To KF button on the GUI will cause the Keyframe on a selected track that is nearest the selected Keyframe to move to the position of the selected Keyframe. If 2 Keyframes are equidistant from the position then neither will snap.

Handling Large Amounts of Timeline Data

There may be times when creating a timeline that there are a large number of tracks on an individual layer within the timeline. The timeline menus can only display up to 7 tracks at any one time. The order in which tracks are displayed depends on a number of factors and it is possible for parameters of particular interest to be ordered such that they can not all be viewed at once. Kahuna offers a number of ways in which tracks can be moved together to aid visualization.

Scrolling

The scroll bar to the right of the tracks allows the user to scroll up and down to view further timeline tracks in the track list. When in **Edit Enable** mode the 'Track' parameter moves the highlight up and down the lost of tracks, scrolling as it moves over the top or bottom of the screen.

Changing Track Order

At the **Parameter Level** menu, when a track is highlighted, '?' and '?' control buttons are available at the bottom of the screen. Pressing these buttons moves the highlighted track up or down the screen thus changing its position within the list of tracks on the layer. Using this facility it is possible to place parameters of interest, from a large list of parameters, together on the screen in order to aid visualization.

Changing position of a number of tracks

By using a combination of bundles and the '?' and '?' control buttons it is possible to move a number of isolated tracks together at a new position on the list. Select all the tracks that will be move together, then bundle them using the 'Bundle' button. Highlight the Bundle summary track and move it to the required position. Now press the select button of the Bundle track so that the 'Bundle' button lights up green. Press the 'Bundle' button to undo the Bundle. The originally selected tracks are now positioned next to each other at the desired position in the track list.

Bundles vs. Groups

Bundles and Groups are two ways that Kahuna allows the user to closely associate selected parameters, in order to aid visualization and editing of those parameters.

Groups are designed to bind related parameters together in order to apply synchronized behavior (i.e. movement) to the related parameters. All parameters within a group are forced to have concurrent keyframes.

Bundles are designed to allow the user to bring together particular parameters of interest in order to visualize and edit their behavior in relation to each other. Parameters within a bundle do not have to have concurrent keyframes.

Features for Advanced Users

Play Button Cloning

The play buttons within each of the timeline menus can be cloned to the **User Function** buttons using the standard Kahuna Copy Clone/Paste Clone functionality. To clone a button, touch the **{COPY CLONE}** button on the GUI and it will flash. Touch the **{PASTE CLONE}** button on the GUI and the **Clone Paste Setup** menu will appear with a number of options that will affect how the button will be cloned.

Clone Paste Setup Menu

When the timeline menu run button being cloned is for an M/E, the **Follow M/E/DVE** button is enabled in the menu. If the **Follow M/E/DVE** is not selected (unlit) then the user function button that is pasted to will always run the M/E that the cloned button was associated with in the menu, however if 'Follow M/E/DVE' is selected (lit green) then the user function button will run the M/E that the **User Function** buttons bank is associated with on the panel.

When the timeline menu run button being cloned is for a bus layer (i.e. Key 1), the 'Follow Bus' button will be enabled in the menu as well as the **{Follow M/E/DVE}** button. if the 'Follow Bus' button is not selected then the user function button will always run the bus that the cloned button was associated with in the menu, however if 'Follow Bus' is selected then the clone button will run the bus that the User Function buttons bank is associated with.

Touch the **{PASTE CLONE}** button, press and release the **User Function** button on which the clone will be created. Releasing the **Paste** button will complete the clone.

The Table below gives examples of what the cloned button will run depending on what menu button was copied, what Follow setup was selected, and what M/E and Key bus the bank that the pasted **User Function** button is set to:

Copied Run Button	Follow M/E/DVE	Follow Bus	Bank M/E	Bank Bus	Cloned Run
All Timeline	N/A	N/A	N/A	N/A	All Timeline
M/E1	YES	N/A	M/E2	N/A	M/E2
M/E1	NO	N/A	M/E2	N/A	M/E1
M/E1 Key1	YES	YES	M/E2	Key2	M/E2 Key2
M/E1 Key1	YES	NO	M/E2	Key2	M/E2 Key1
M/E1 Key1	NO	YES	M/E2	Key2	M/E1 Key2
M/E1 Key1	NO	NO	M/E2	Key2	M/E1 Key1

Timeline Defaults

In the **User Config** section of the Kahuna Menus (accessed by pressing the **[USER CONFIG]** button on the GUI) there is a **Timeline Defaults** menu where the user can set up default values used by the system when creating timelines.

The Timeline Defaults Menu
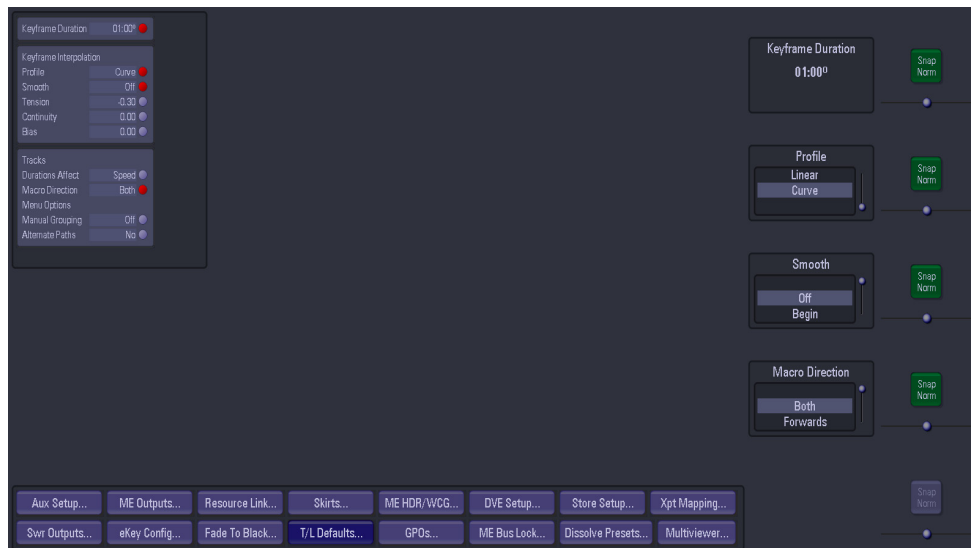
The Timeline Default Values that can be set are:

Duration

This value is the default keyframe duration used by the system. A keyframe will be given this default duration when it is inserted at the end of a timeline or when inserted anywhere within the existing active area using either **{Insert Next}** or **{Insert Prev}**. Needs more explanation once functionality of **{Insert Next}** and **{Insert Prev}** has been finalized.

Profile/Smooth/Tension/Continuity/Bias

These are the default movement setting applied to a new keyframe when it is inserted in the timeline. These values are only relevant when the parameter being timelined can have movement settings applied to it.

Macro Direction

This value is the default direction setting that is applied to any macro keyframes inserted into a timeline.

Manual Grouping

This setting allows or disallows the manual creation of groups from parameters that are currently in the timeline. When this option is switched on the group button becomes activated in the Parameter Level menus when in edit enable mode.

Inhibiting the Reference Point

Sometimes there are situations during timeline editing and timeline playback where it is undesirable for the reference point to be continually pushed back into the system. For those situations, the **{Inhibit Ref}** function can be activated. Once on, only values generated by

timeline tracks will be applied to the switcher. Not just that, but only the active regions of a track will be applied. The region between the first and last keyframe on a track is the active region.

The menu illustrates the inhibited reference point by not drawing a ghost of a constant span from the first and last keyframes to the ends of the timeline.

Loading and Saving Timelines

The tutorials have demonstrated how to save a timeline in a DMEM. It is almost the same as saving a regular snapshot DMEM, except that the 'Timeline' mode needs activating too. This can be done on the keypad with the '/' key. It can also be done from the DMEM/GMEM Content menu. Once using the number pad to start any kind of save, the user can bring up this menu by pressing the **{Content}** button. It shows a mock-up of the panel's VFD and clearly laid-out buttons for specifying what will be saved in the user specific file. Within this menu, the button marked 'Timeline' (top-right) is used to tell the switcher whether or not to include timeline data in the saved file (regardless of whether saving a GMEM or a DMEM).

Events, Macros and User Parameters

Any parameters that are outside of an M/E or DVE are system parameters of one sort or another. Only two categories of system parameter can be timelined. Those are **User Config** parameters and Macros/Events - and only some parts of the **User Config** can be timelined. The timeline menus make it clear what part of the switcher owns which timelined parameter. If a timeline that only contains parameters within a particular M/E is to be saved, then a DMEM is probably the right choice. As soon as the parameters spread to two or more M/Es; or if the some parameters are in an M/E and others are in the **User Config**, then the only way to capture it all in one file is to save a GMEM and include all relevant M/Es when saving. Sometimes, the timeline will only contain User Config parameters. If this is the case, include the timeline when saving the **User Config** file.

Macros

Macros are slightly more complex, as they can exist within an M/E's timeline, or at the switcher level. Any macros that were inserted within an M/E will be saved in a DMEM of that M/E, but those inserted at the switcher level can only be saved in a GMEM.

It should go without saying that for any parameter to be saved; its enable must be switched on.

Adding Macros to Timelines

Macros can be inserted into the timeline at both the switcher and the Module level. Pressing the **[MACROS]** button at the base of the GUI or Module level menus takes switches to the **Insert Macros** menu (this button is only available when **Timeline Edit Enable** is switched on).

Accessing Module and Layer Level Menus When No Timeline Exists

On pressing the **[TIMELINE]** Button on the GUI the Timeline Menu is entered at the Switcher level. It is possible to navigate down to the module level of the menu by pressing the delegate button for the required module on the **Delegate** section of the GUI. The user can then navigate between the different modules using the other module delegate buttons. Similarly it is possible to navigate down from the module level to a Layer level of the menu by pressing the delegate button for the required layer, and to navigate between the layers using the other level delegate buttons.

Inserting Macros into a Timeline
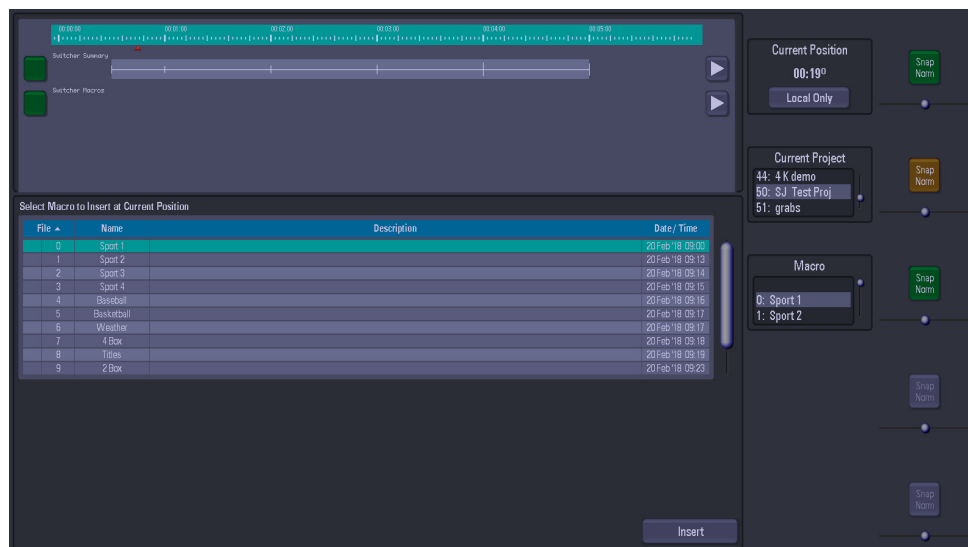
Insert Macros Menu

The **Insert Macros** menu displays a short version of the track display with a time scale and two tracks. The first track is the summary track for the level where the macros are to be inserted (Switcher or Module). The second track displays a summary of the macros that are timelined at that level.

Below the tracks is a file selection table from which you can select which macro to insert. The project knob on the right of the menu allows you to select which project the table is displaying. The required macro from the project can be selected either by use of the Macro knob, or by tapping on the required macro in the table.

The **Current Position** parameter allows you to select the time at which the macro is to be inserted. Adjusting the knob has the same effect as adjusting the current position knob on other levels of the timeline menu. It will adjust the current position of all levels within the timeline, unless the **{Local Only}** button is activated, in which case it will just adjust the current position of the current level.

To insert the selected Macro at the Current position press the **{Insert}** button at the base of the menu. A tick will appear on the Macro track to indicate that a macro keyframe has been inserted at the selected position. Any number of macros may be inserted into the timeline, and any individual macro can be inserted at multiple positions.

Pressing the up arrow on the GUI will return you to the summary menu for the current level. This menu will now display a summary track for the levels macros.
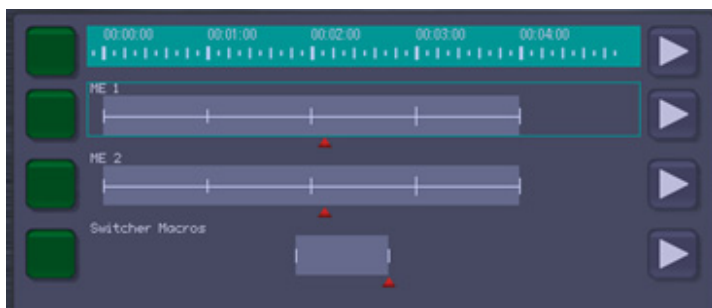
Summary Level Containing Macro Track

By double tapping on the macro track either in the summary menu or in the **{Insert Macro}** menu you can open the Macro edit menu for the current level.

Viewing and Editing Macros in Timeline
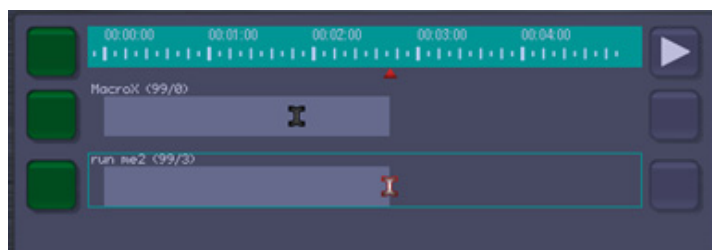
The **Macro Edit** menu is similar to the parameter edit menu in that tracks can be highlighted and selected in order to edit their offsets or delete unwanted tracks. However the display of keyframes within this menu is slightly different from the parameter menu. Each macro keyframe is represented by an icon that indicates the direction in which the macro is fired. Also, unlike in parameter menus, there are no spans between the individual keyframes.

When a Macro keyframe is selected its icon lights up and the control knobs and buttons relevant to Macro keyframe editing are activated, allowing you to edit Macro properties:

Macro Position Parameter

This is similar to the **KF Position** parameter in the **Parameter** menu. It allows the user to adjust the time position of the selected macro keyframe. As with parameter keyframes the position of a macro keyframe is limited by the positions of its neighboring keyframes.

Direction Parameter

This knob allows you to edit the direction in which the macro will be fired. The macro can be fired only when the timeline is running in forward direction, only running in backward direction or running in both directions. The keyframe icon changes with this property to indicate the direction that has been set.

{Delete KF} *Button*

Pressing this button will delete the selected macro keyframe.

As with the Parameter Menu, editing done in the Macro Menu can be undone by pressing the **[UNDO]** button on the GUI if the button is lit.

Loading and Saving Timelines

Loading and saving timelines is almost the same as saving a regular snapshot DMEM, except that the 'Timeline' mode needs activating too. This can be done on the keypad with the '/' key. It can also be done from the DMEM/GMEM Content menu. You can bring up this menu by pressing the **[CONTENT]** button next to the number keypad. It shows a mock-up of the panel's VFD and clearly laid-out buttons for specifying what you want saved in your file. Within this menu, the button marked 'Timeline' (top-right) is used to tell the switcher whether or not to include timeline data in the saved file (regardless of whether you are saving a GMEM or a DMEM).

As with other parameters, in order for a timeline macro to be saved, its enable must be switched on. Macros come under the Events enable. Like other timeline parameters, the macro tracks can be individually enabled/disabled via the enable button to the left of the track in the timeline menu. When Saving a Timeline containing System level macros, ensure that the **Event T/L** button is selected in the DMEM/GMEM Content menu.

DMEM/GMEM Content Menu

What should the timeline do when it is loaded?

This is controlled by the state of two buttons in the timeline edit pad - **{Auto Goto}** and **{Auto Run}** - when the file is saved. By default, **{Auto Goto}** is on, but **{Auto Run}** is not. This gives the most commonly required behavior, which is that when the DMEM or GMEM containing the timeline is recalled, it asserts its values on the system (including all of those values in the reference point) at the position it was at when it was saved. The way that the DMEM applies a set of values when it is loaded, but does not start running, makes this mode behave much like a regular DMEM that does not contain a timeline. Generally, timelines are intended to be run from the start, so it is good practice to go to the start of the timeline before saving it.

If **{Auto Goto}** is also switched off when the timeline is saved, then on loading nothing will appear to happen. This is sometimes useful when you are doing the load to cue-up an effect, and you want nothing in the switcher to change until you press **{Run}**. After the load, any change to the timeline position (this includes pressing 'RUN') will immediately apply all the timeline values into the switcher.

{Auto Run} simply tells the switcher to press **{Run}** automatically once the load is complete.

Saving System and M/E Macros

Any macros that were inserted within an ME timeline can be saved in a DMEM of that ME, but macros inserted at the switcher level can only be saved in a GMEM. Note that the actual Macro file is not saved in the timeline, just a reference to its project and file numbers.

If an old timeline is loaded that references a macro file that has since changed, the new macro will be used by the timeline, not the old one. If a macro of the loaded project/file number does not exist then it will fail to load and run - however the rest of the timeline will be unaffected.

On loading a timeline the system will force the load of any macro files associated with the timeline that are not already loaded into the system memory. Depending on the size of the macro file, this may take some time - therefore if the timeline was saved with **{Auto Run}** set, there could be a delay before a macro is run, whilst it completes loading.

If the user wishes to load a Timeline containing macros, and run them straight away it may be advisable to pre-load them into the system. This can be achieved in a number ways. For a small number of macros it may be possible to assign each of them to a **User Function** button. Alternatively, if all the macro's are in the same project, then the whole set of macros in a project can be cached in memory via the **Macro - Load** menu.

Macro Only Timelines

There may be times when you want to create a timeline purely for firing macros. It is therefore possible to create timelines that only contain one or more macro keyframes - nothing else. If you wish to create a macro only timeline, and have no intention of adding any other parameters to the timeline, it is not necessary to first insert a **Reference Point**.

When a timeline is saved to a DMEM/GMEM file the Reference point data saved with the file is a copy of the current system data, not a copy of the current reference point. So even if no Reference Point was created with a Macro only timeline, a reference point will still be saved to file.

As discussed above, when loading a file containing a timeline, the reference point from the file will be asserted when the current position of the timeline is altered in any way. This may not be desirable when loading a macro only timeline if the intention of the timeline is purely to fire specific macros, not to adjust the system status in any way.

If the user does not want a Reference Point to be pushed into the system when loading or running a macro only timeline, it is advisable to save the timeline with the **{Inhibit Ref}** and **{Save Inhibit Ref}** buttons selected in the DMEM/GMEM Content menu when you save the file. This will ensure that Reference Point assertion is inhibited when the timeline is loaded and run.

> Note: Even with the Inhibit Ref options switched on, the Reference Point data will still be saved and loaded with the DMEM/GMEM file. The options just prevent the Reference Point from being asserted. If after loading the timeline the 'Inhibit Ref' option is switched off via the button in the Timeline area of the panel, the reference point will then be asserted whenever the current timeline position is altered.

> Note: The **{Inhibit Ref}** option will stay active until you either switch it off manually, or you load another timeline that had 'Save Inhibit Ref' on and 'Inhibit Ref' off in the Content Menu when saved. If you load other timelines that expect to apply their reference point, but do not turn off **{Inhibit Ref},** then you may experience unexpected behavior until **{Inhibit Ref}** is turned off.

Inhibit Ref

As explained in the section about the **{Inhibit Ref}** button, there are some advanced ways of working that become possible when the reference point is inhibited. With that in mind, when saving a DMEM or GMEM the user is able to choose whether or not the file also contains the current state of the **{Inhibit Ref}** button. If included - by activating the 'Save Inhibit Ref' button - its state will be applied back to the switcher whenever the file is loaded. It is normally best to leave **{Inhibit Ref}** switched off, and not include it any files saved.

What should the timeline do when loaded?

This is controlled by the state of two buttons in the timeline edit area - **{Auto Goto}** and **{Auto Run}** - when the file is saved. By default, **{Auto Egotist}** on, but **{Auto Run}** is not. This gives the most commonly required behavior, which is that when the DMEM or GMEM containing the timeline is recalled, it asserts its values on the system (including all of those values in the reference point) at the position it was at when it was saved. The way that the DMEM applies a set of values when it is loaded, but does not start running makes this mode behave much like a regular DMEM that does not contain a timeline. Generally, timelines are intended to be run from the start, so it is good practice to go to the start of the timeline before saving it.

If **{Auto Goto}** is also switched off when the timeline is saved, then on loading nothing will appear to happen. This is sometimes useful when using the load to cue-up an effect, and nothing in the switcher is to change until **{Run}** is pressed. After the load, any change to the timeline position (this includes pressing **{Willinger}** immediately apply all the timeline values into the switcher.

{Auto Run} simply tells the switcher to press **{Run}** automatically once the load is complete.

Loading Onto Different M/Es

Just like with regular DMEMs, any timeline DMEM can be loaded onto a different M/E than the one it was saved on.

Effective Use of Enables

Holding Crosspoints

Kahuna has a number of tools to help prevent inadvertent changes to crosspoints on buses. The last tutorial demonstrated a way of reducing risk if the user forgets to (or choose not to) use them. By carefully selecting what is enabled when recording (and more importantly, saving) a timeline, undesired changes to all parts of the switcher (including crosspoints) can be avoided. Don't think that just because your timeline has no track for parameters X, Y, and Z that those parameters will not be touched by the timeline. The same thing that makes sure everything is set up correctly when recalling the "animated two-box effect" (mentioned earlier in the **Partial Keyframing** section), can also mess up the border color that had been set up just prior to loading it. The reference point also respects the same enables that the rest of the timeline is using. For this reason, it is really important to understand what parameters are covered by which enables. Generally speaking, it is best to keep the number of enabled parts of the switcher to the minimum necessary for the timeline to work.

Merge Enables

When a DMEM is loaded into an M/E (regardless of whether the DMEM contains a timeline or not) the enables from the DMEM are also loaded into the M/E. For many situations, this simple and predictable behavior is often what is wanted - but not always.

It would be quite possible that the user would built up a different effect for each key-layer and saved each timeline to a different DMEM (with appropriately-set enables). With the system described above, recalling a set of different effects to all run together would not 'just work'. The saved enables would ensure that each load would place the new timeline into its key-layer without clearing out the timelines of the other key-layers, so that part would work. The problem is that the each load would also set the enables in the system. The system would end up with a number of timelines, but enables that were saved with the last loaded DMEM would stop all the other key-layers from playing back. You would need to manually switch those enables back on for it to work. The solution to this problem is the 'Merge **Enables**' button in the **Panel Control** area. If this is on during a load, the system won't turn off any existing enables when loading a DMEM. This button turns itself off automatically after completing the load, but can be latched on (indicated by it lighting up red) if the user presses and holds it.

Resize Overview

The Resize function allows the user to manipulate Key layers using the Kahuna Resize Engines. The user is able to resize the key layer using Zoom, move position of the Key layer using the X/Y parameters, add borders or crop edges. These are just some of the many functions within Resize.

Note: Before describing how to use the Resize functions, the user will need to add a key layer onto a monitor.
The mainframe should have also had the inputs, outputs, M/Es, crosspoints and stores setup.

Taking a Key Layer to an Output

This section of the manual will describe how to place a key layer onto a background source. Keys 1 to 4 on an M/E are accessed using the control surface, described in the previous section; the Key Bus buttons on the control surface are used to select the required key and the required source is selected using the Key Bus Crosspoint buttons.

Key source
selection
buttons

Key Bus
selection buttons

Up/Down toggle buttons
to select the required
Key
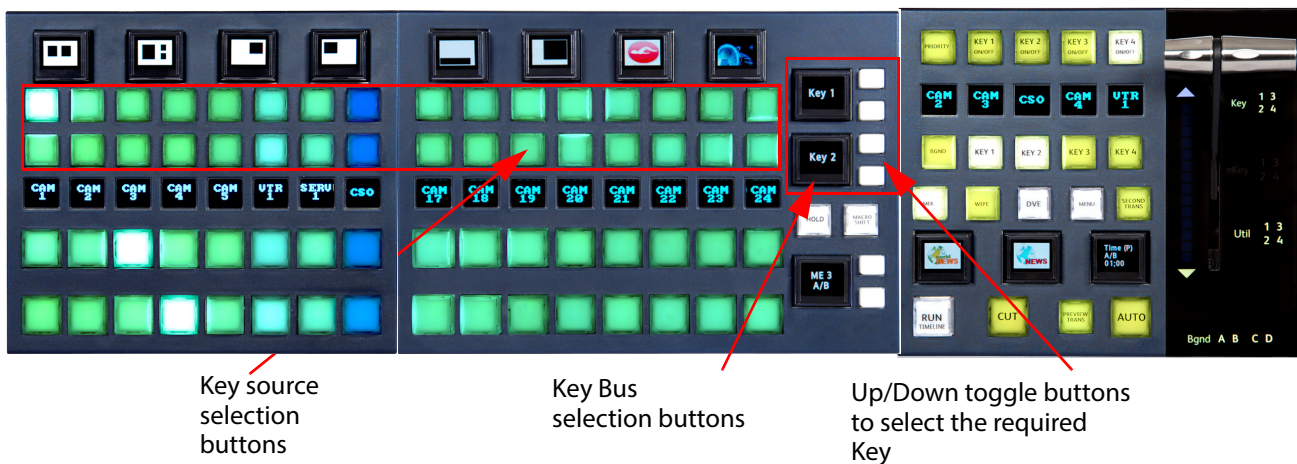
The Key Layers can then be cut to the source output using the Transition Control area of the control surface.

There are two ways to place a key layer onto a monitor:

- The first method is using **Key Selection** OLED buttons with the UP/Down toggle buttons. With the Key source selected, touch the OLED Key selection button and then use the Up/Down toggle buttons to scroll to the required Key, and then touch the OLED button again to confirm the selection.

- The second method is using the **Key On/Off** buttons (MAV-Trans module). The buttons toggle On/Off when pressed. With no key layer selected the buttons are unlit, when pressed the button will either light white or tallied red. The key layer can now be seen on the monitor.

Key On/Off Buttons

Key Selection Buttons
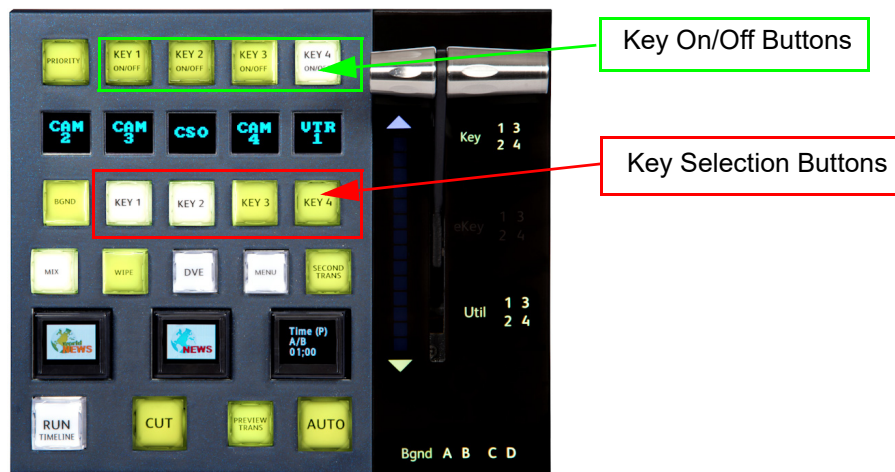
Note: If the selected Key Layer is full size over a Pgm bus background, the tally lamp on the Pgm bus will not be lit, once the user has used the "Zoom" parameter to make the Key layer smaller the tally lamp on the Pgm bus will light up again.

Note: White = off air, Red = tallied on air and contributing to the programme output
The color of the buttons may vary depending on the user defined button color scheme.

Resize - Fill Control

This menu is where the manipulation of Key Layers is done as mentioned at the start of this section of the manual.

> Note: Notice that the title bar displays the M/E and Key that is being controlled.
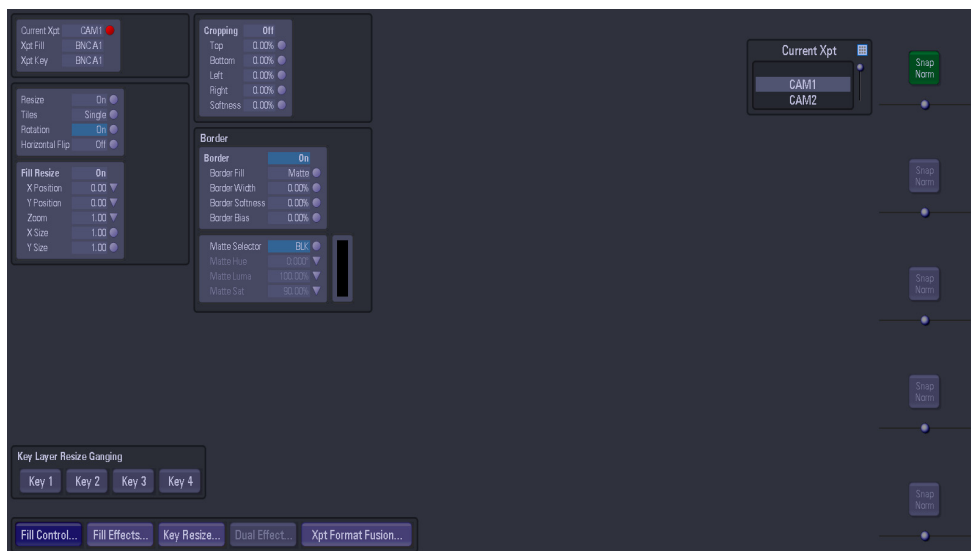
The **Bus Info** area of the menu displays the currently selected crosspoint.
Xpt Fill and **Xpt Key** display the Fill and Key sources for the key layers that are associated to the selected crosspoints.

Position & Size

In the **Position & Size** attacher area of the menu, touch the Resize On/Off menu box, using the parameter menu on the right, turn the Resize On for the selected source (or press the **[RE-SIZE]** button in the Key Control area of the control panel).

Dual Tile - will allow the Dual Tile mode options; which were previously grayed out to be selected. This menu also allows Hard Crop On/OFF to be selected for Dual Tile Crop parameters.
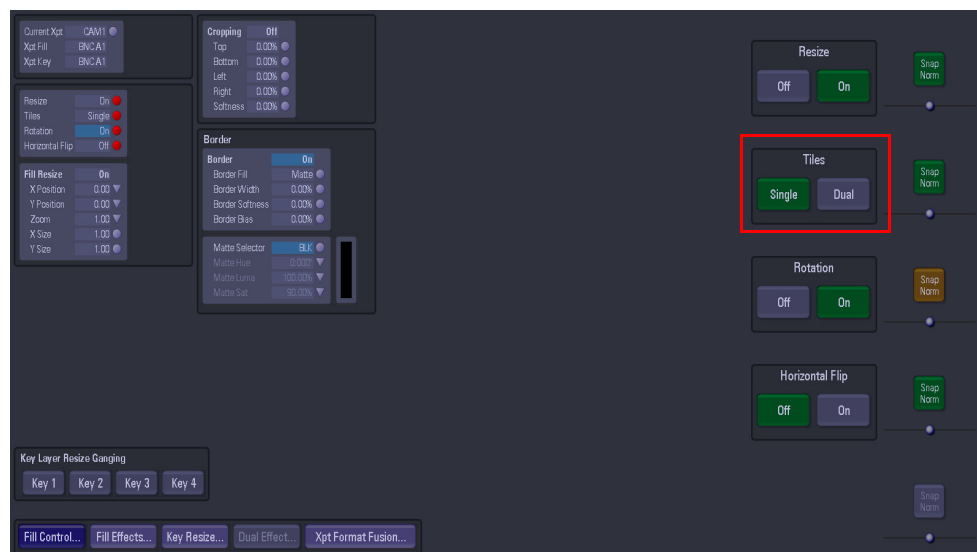
Horizontal Flip - as the function suggests, will horizontally flip the source on the key layer.

Fill Resize - will turn on the re-size parameters in this attacher

X/Y Position - Parameters are used to move the position of the key layer around the monitor screen as shown below.

Y Position

X Position

X Position

Y Position
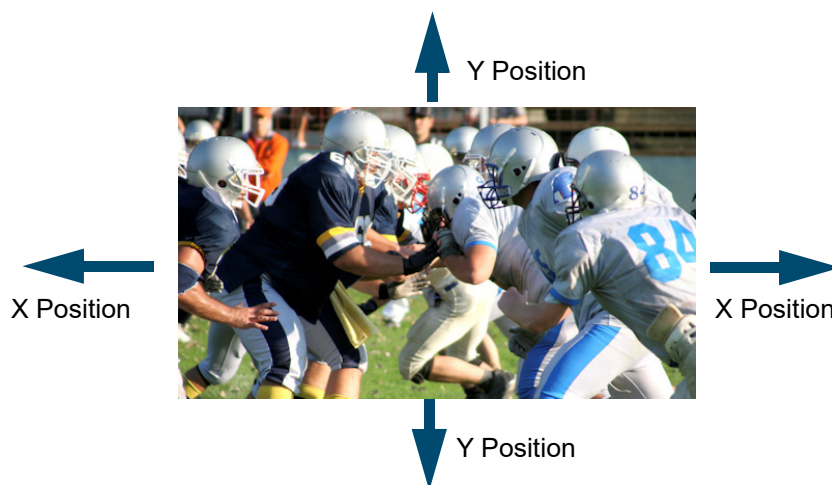
Zoom - Parameter is used to zoom the key layer in and out.

X/Y Size - Parameter is used to increase or decrease (stretch) the width or height of the key layer.

X Size

Y Size

FormatFusion^{TM}

The Xpt FormatFusion menu controls, allow the user to change the aspect ratio, zoom and position of a crosspoint source.
This function would most commonly be used to change the aspect ratio of a 525 or 625 4:3 source to a 16:9 aspect ratio using the Kahuna FormatFusion engines.

Original 4:3 Crosspoint
Source on a 16:9 background

With Full Width Applied

With Full Height Applied

With Zoom Applied to fill 16:9
Aspect

Aspect Mode has 3 settings: **Zoom**, **Full Width** and **Full Height**.

The **Zoom** parameter allows the crosspoint source to be zoomed out to fill the 16:9 aspect, when the source is zoomed to 16:9; it will appear slightly larger. The zoom function will not work if the aspect is set to Full Width or Full Height.
The **Full Width** parameter changes the aspect so that the full width of the 16:9 aspect is filled, in this setting a letter box effect is seen where there are bars at the top and bottom of the image.
The **Full Height** parameter will change the aspect so that the full height of the 16:9 aspect ratio is filled, leaving bars either side of the image.
The **X and Y Position** allow the source to be re-positioned within the 16:9 space.

The **Crop** adjustments allow the user to crop areas of the image that may need to be hidden from view. Adjustments can be made to the **Top**, **Bottom**, **Left** and **Right** of the image.

This menu has all the same aspect ratio parameter controls as in the Crosspoint Correction menu, but has a table that displays each crosspoint and any individual settings made to the crosspoint (as shown above).

Crop

The crop menu as it suggests allows the user to crop the key layer, and also allows the user to apply soft edges.

Cropping On/Off - Switches the crop facility On or Off, press the On/Off buttons in the parameter control area of the menu.

Top, Bottom, Left and Right - Crops the Fill edges

Softness - Softens the outside edges of the crop

Original Key Layer

Bottom Crop

Top Crop

Left Crop

Right Crop

Border

This function allows the user to apply a border and effects around a key layer.

Border On/Off - Switches the Border On or Off

Border Fill - Selects source for the border fill from a Matte selected using the Matte Selector parameters, Util 1/Util 2 or Matte (U1/U2) if the Util buses are being used for eKeys.

Border Width - Adjusts the overall width of the border

Border Softness - Softens the outside edges of the border

Border Bias - Adjusts the horizontal and vertical bias of the border on rectangular borders. This parameter is set at 0%, adjusting the parameter in a positive direction adjusts the bias on the left and right sides, adjust from 0% in a negative direction and the border bias top and bottom is adjusted

Original Key Layer

Border Applied

Changed Border Fill

Border Width Adjusted

Positive Bias

Negative Bias

The **Matte Selector** and **Hue**, **Luma** and **Sat** parameters are used to adjust the color of the border around a key layer when the option is selected in the Border Fill parameter. The user is able to select one of 16 preset Mattes, or create a user defined color for the border using the Hue, Luma and Sat parameters.

Matte Selector - Selects the preset Mattes 1 to 16 or a Local Matte that allows the user to create a their own border color.

Matte Hue, Luma and Sat - These parameters allow the user to adjusts the Hue, Luma and Saturation levels of the Local Matte, the user is able to create their own unique border color around a key layer.

Fill Effects

This menu allows the user to add a Defocus to the key layer and adjust the Bias of the defocus inwards or outwards of the center point of defocus.
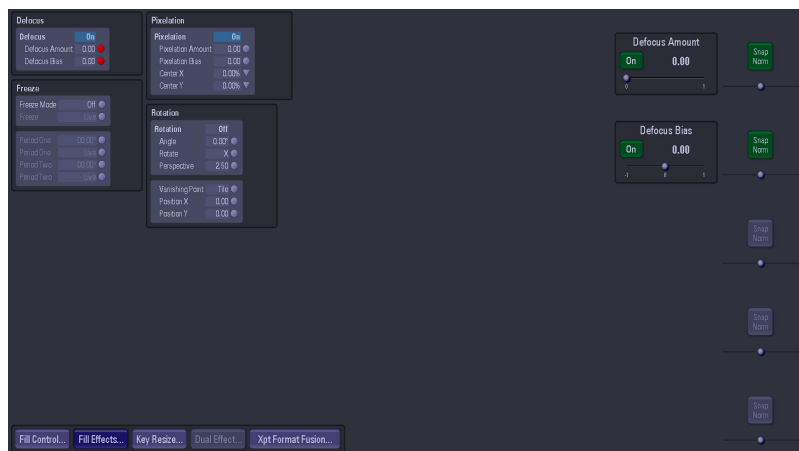
Freeze - This function is used to freeze a video source that has been applied to a Key Layer.

Freeze Mode - turns freeze mode On/Off and selects between the following actions:

Manual - this allows the user to manually freeze the video source using the **{Live} {Freeze}** buttons.

Multi Grab 1 - in this mode a freeze of a pre-determined duration can be applied, this will freeze the video source for the set period of frames or time, whilst the video is still playing.

Multigrab 2 - this will set a second pre determined duration and will freeze the video after Multi Grab 1 has finished its freeze.

Freeze - selects between Live (video playing) or Freeze (video frozen)

Period One - at the next Field 1,2 or Frame as determined, the live video will be frozen for the specified duration

Period Two -- this determines the duration of the second period of the freeze

Pixelation - On/Off

Pixelation Amount - The level of Pixelation applied to a source

Pixelation Bias - Adjusts the aspect ratio of the pixels

Center X - Changes the Pixelation center on the x-axis

Center Y - Changes the Pixelation center on the y-axis

2D DVE Fill Effects - Rotation

These parameters affect the Key and Fill portions, unless "As Fill" is turned off in the "Key Resize" menu, and allow the user to have even more control over a SuperKey layer. The parameters will rotate a Key layer on an X/Y axis, change the angle, adjust perspective and move the vanishing point of the Key layer. The adjustments will affect the Fill and Key portions of the Key layer.
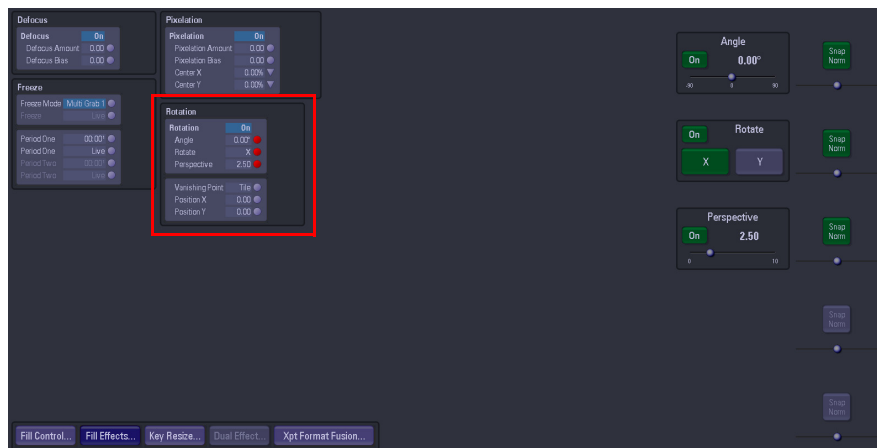
Some examples of the 2D DVE effects on a Key layer

Angle Rotate X (positive)

Angle Rotate X (negative)

Angle Rotate Y (positive)

Angle - this adjusts the movement of the key layer in a positive or negative way on an X or Y axis

Rotate - this selects the X or Y axis for the angle adjustment

Perspective - this will move the perspective point on the Key layer

Vanishing Point - in **Tile** mode, the vanishing point is placed on the center of the Key layer, so the dimensions of the Key layer will always be the same where ever it is placed in the viewing area. Selecting **Screen** will give a more true 3D DVE effect and will naturally distort the Key layer as it is moved around the viewing area.
Position X/Y - this affects the sheering of the Key layer, by giving the effect of moving the camera position.

Key Resize

This function allows the user to resize a "Key Source" independently of a "Fill Source".
To use **Key Control**, first make sure that a Key source and Fill source is setup on the crosspoints on the control surface. This is done using the Store function to provide the source for the crosspoints and setting up **Store Coupling** in the **User Config - Store Coupling & Linking** menu to couple the Key source and Fill source over two crosspoints.

If the **{As Fill}** buttons in the menu are Green, this means that what ever changes are made in the Resize Fill menu, the changes apply to the Key and Fill sources together.

Press the **{As Fill}** buttons so that they are turned "**Off**" (Grey), and also make sure that Resize is turned on for the individual functions within the menu. Resize functions are now applied only to the Key source.

All the Resize functions within this menu manipulate and behave in exactly the same way as in the Resize Fill menus described on the previous pages. The only functions that this menu does not have are the Border functions.

Rotation

These parameters affect the Key portion of the Key layer only. They are exactly the same controls as the 2D DVE Fill Effects as described on the previous page. To use these parameters the "As Fill" has to be turned Off. When adjusting the parameters, only the Key portion of the Key layer will be affected.
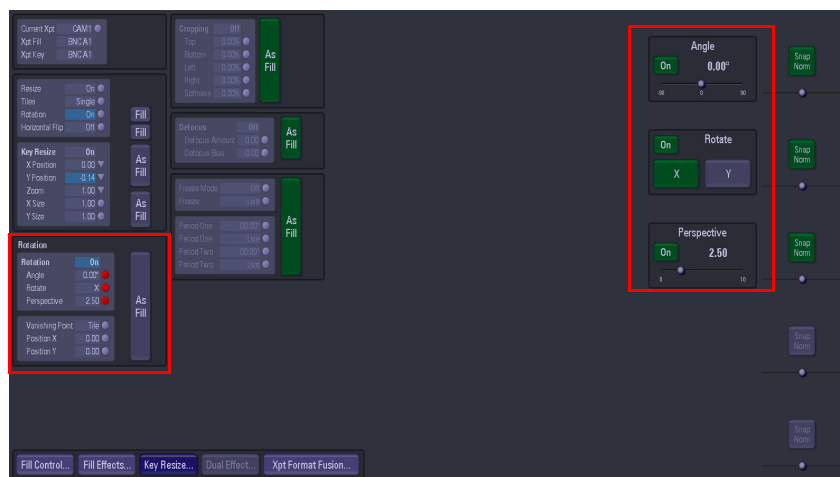
Dual Tile

This function allows you to take an existing Super Key layer and create 2 Tiles (Key Layers) that can be independently resized (Zoom), moved along the XY axis, and cropped.

This function now allows 11 Key Layers per Extreme M/E, these are:

- 4 Super Keys that can now be used as 8 Dual Tiles
- You will also have the 4 eKeys
- Giving you 12 Key Layers on a single M/E

The Dual Tile mode is easy to setup and easy to use. To use this function, bring a Super Key layer onto a monitor (for this example M/E 1 Key 2) and use the Resize controls in the Key Control area of the control panel to Zoom down the key layer.

M/E1 Key 2 Layer Over a background

Next, press the **[RESIZE]** button on the GUI and the following menu will open:
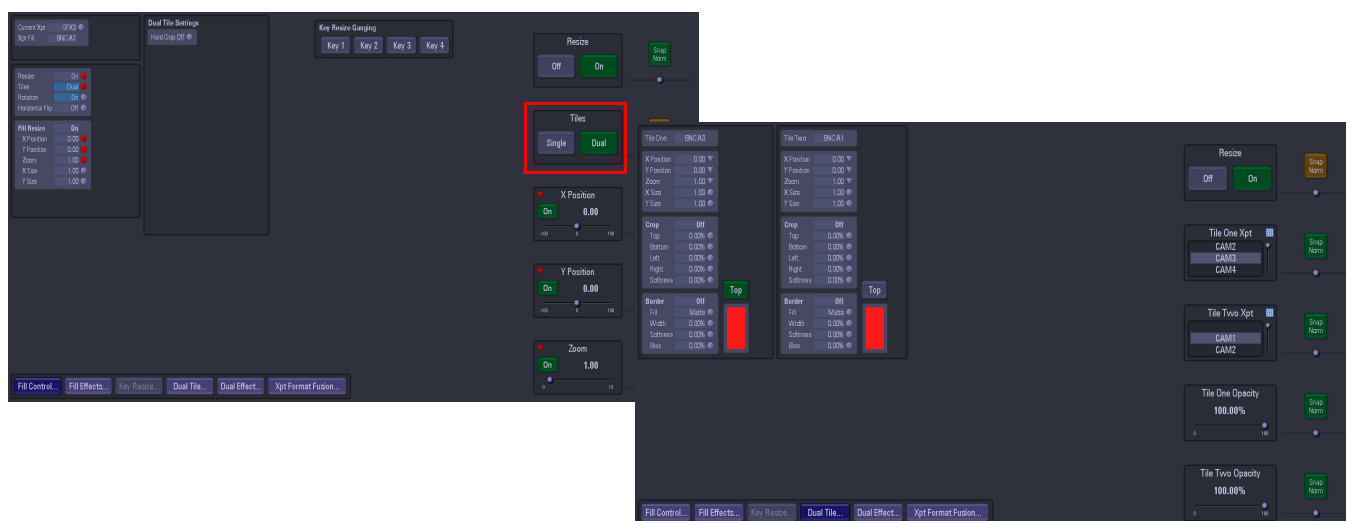
The first menu to open is the **Fill Control**, in this menu turn **ON** the **Resize** and **Dual Tile** parameters.

Notice that the Dual Tile menu button at the bottom of the menu has now come alive, indicating that Dual Tile can now be used.

Dual Tile Menu

Press the Dual Tile menu button to open the menu, notice that the menu is split in two "Tile One" and "Tile Two".

Note: At this point you will only be able to see one tile, the green "Top" button in the menu indicates the tile that is visible.
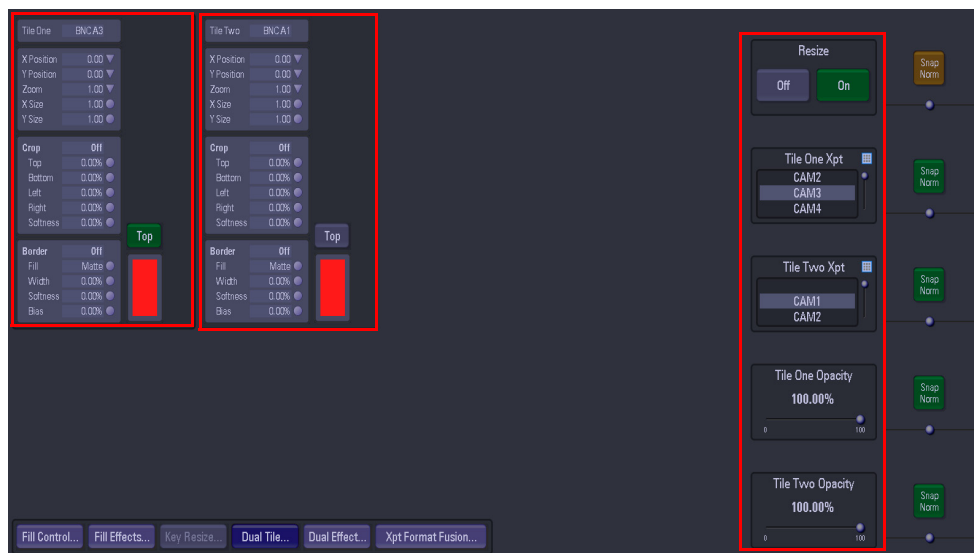
Use the Tile One Xpt and Tile Two Xpt parameters to select sources for the Dual Tiles, the sources can be Xpts, M/E's, DVEs, Stores etc.
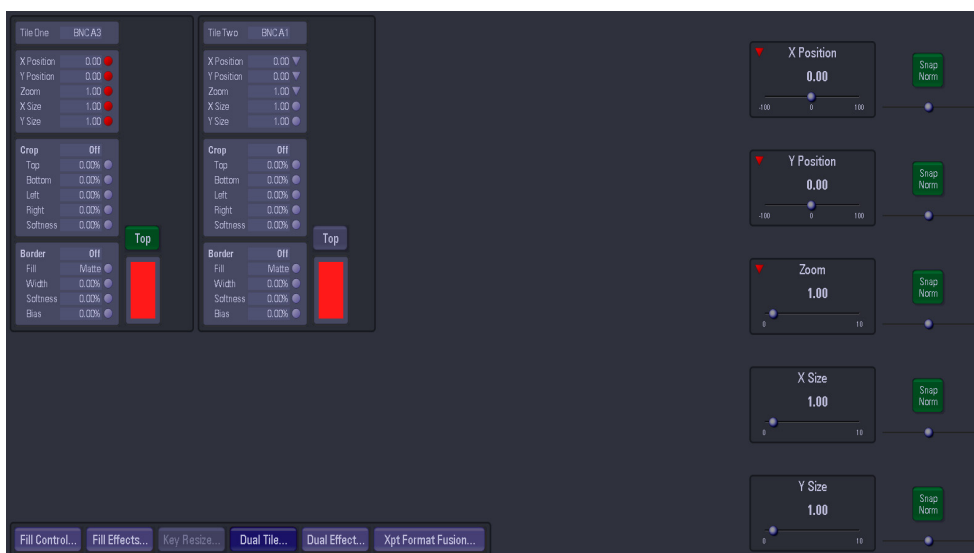
Controlling the Dual Tiles

The two tiles are controlled using the Resize Dual Tile parameters in the menu. If you use the XY parameters for Tile One, the tile will move as expected but you will still not see Tile Two because it is still underneath tile one. Use the XY parameters for Tile two and it will move the tile away from tile one, it is free to move independently around the monitor as required.
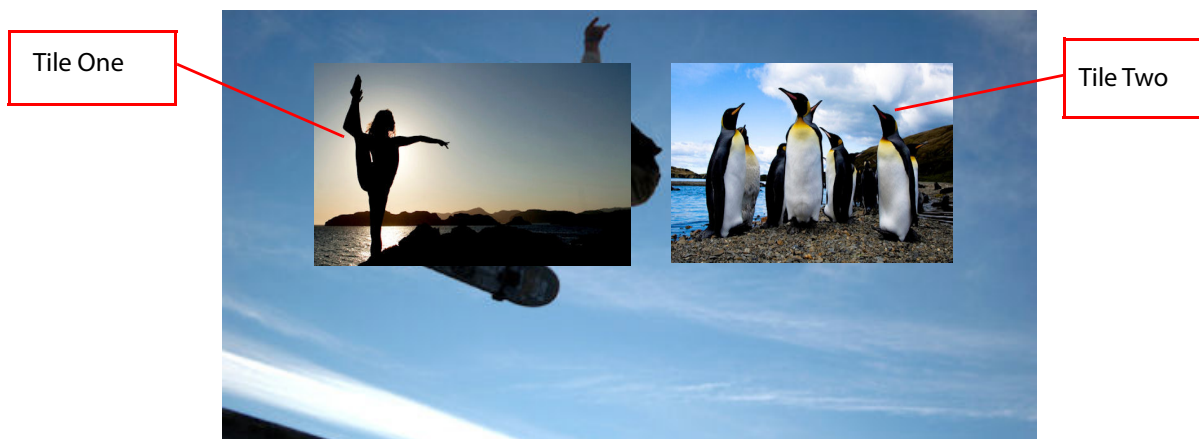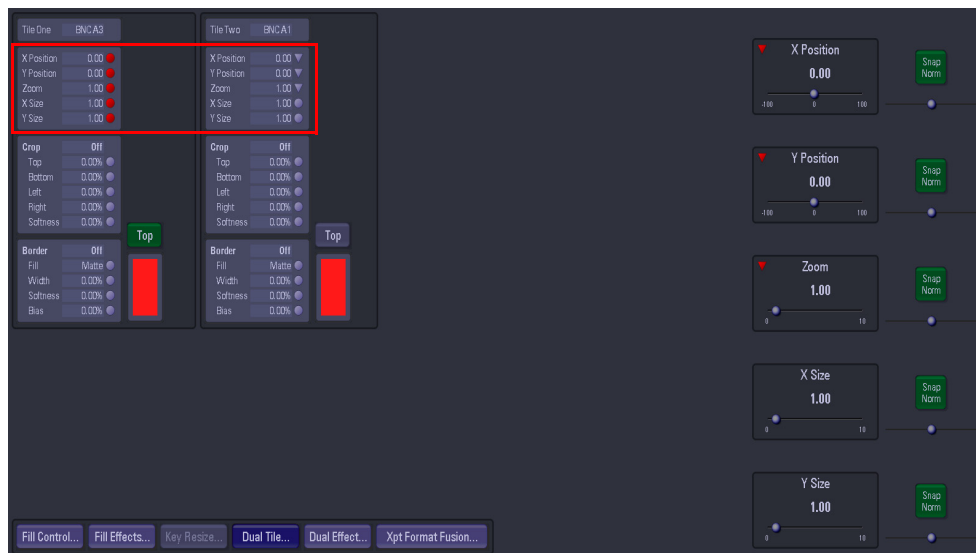
Note: If you use the Resize controls (XY or Zoom) in the Key Control area of the control surface, the both tiles will move together like a global move in the DVE.

Dual Tile Effects

This menu allows the user to add a Defocus to the Tile One or Tile Two key layers individually and adjust the Bias of the defocus inwards or outwards of the center point of defocus.
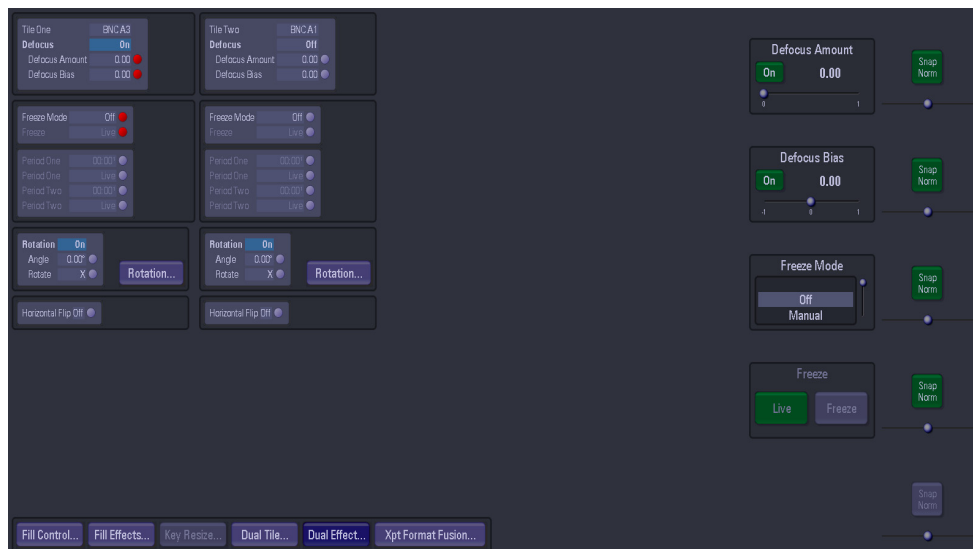
This menu also allows the user to freeze live video and horizontally flip the source on each tile, as explained in the Fill Control and Fill Effects menus.

Placing an eKey Layer onto a Monitor

Note: Before setting up eKeys, make sure that the eKeys are allocated to the M/E in the Make ME menu.

Allocating eKeys

Using eKeys with "Resize" can only be done with "Extreme M/E"; M/E cards.
eKey allocation is done in the **User Config - eKey Config** menu where the user is able to select the type of bus or M/E Key that the eKeys will receive their sources from.

This is done by selecting or touching the M/E - eKey matrix shown in the diagram below (when touched the selected eKey will turn Blue).
Then select either a Key source, i.e. one of the free M/E Keys (M/E Key4 below) column, the selected bus is displayed in the matrix under the selected eKey. The selected Bus button will turn Green.

Note: Util Buses and Background Buses will not allow the eKey to be used in the Resize menus).

The user also has the option of selecting an available Key from the **Key Layer eKeys** area of the menu. Selecting the M/E Key is done in exactly the same way as selecting the Bus based source.
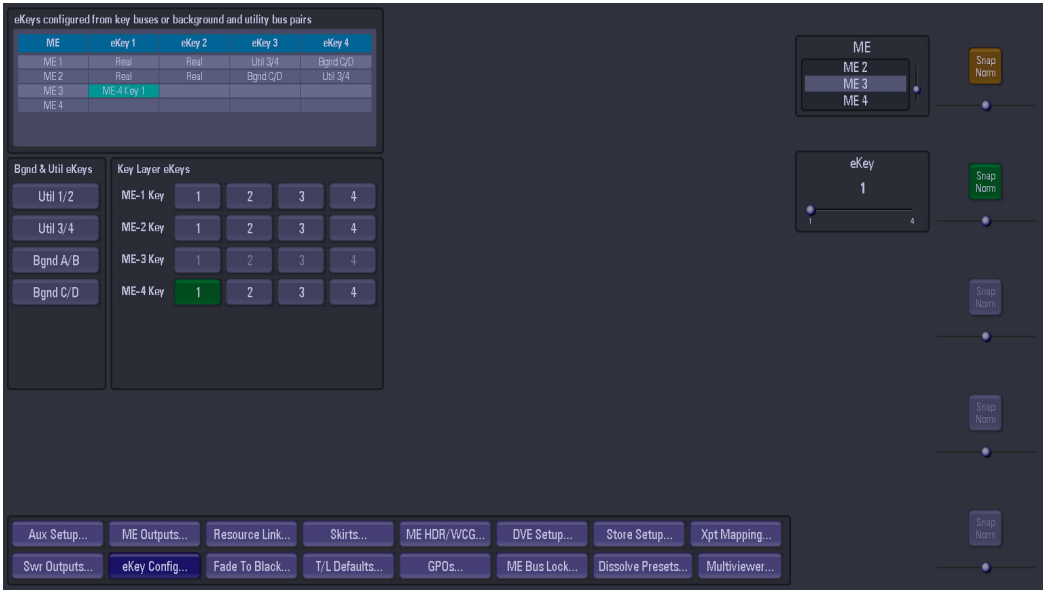
Once the eKey configuration has been setup, the eKey Keyer menu can be accessed by pressing the **[KEYER]** button on the GUI. Then toggle the Key button in the **Delegate** area on the GUI so that the button turns Orange and the required eKey menu will appear.
Toggle the Key Bus button on the Control Surface to select the required eKey Bus until the button turns Orange and use the Key Bus Xpt buttons on the control surface to select the source.
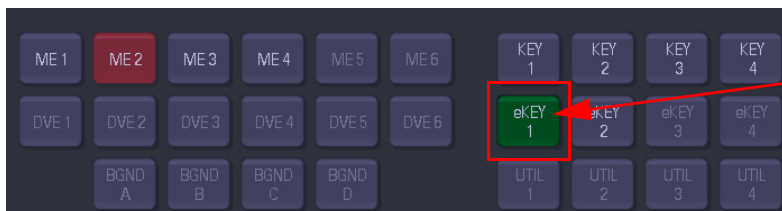
Select the eKey button
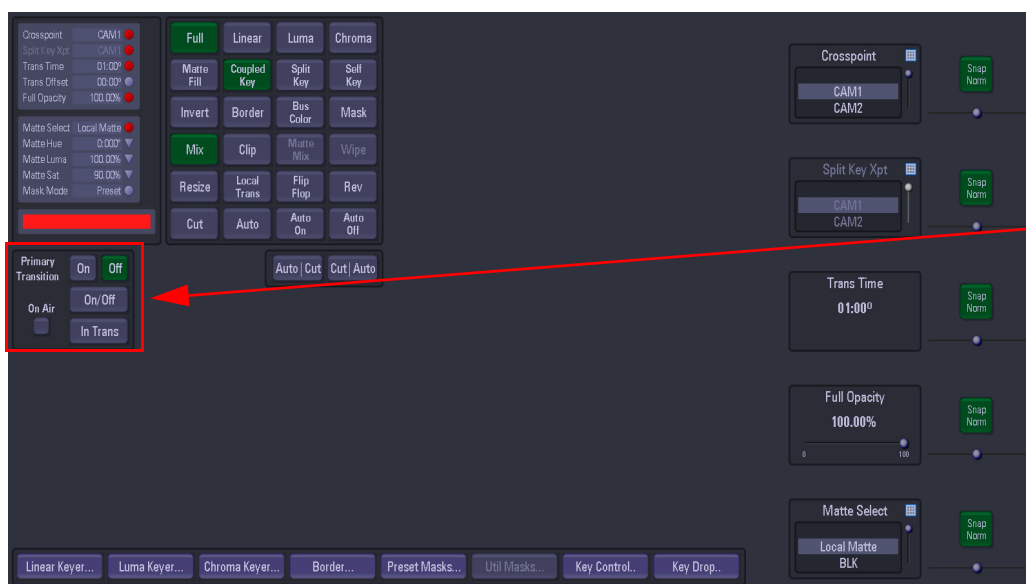
Buttons used to take the eKey layer to the monitor

To take the eKey to the monitor, press either the **{On} or {Off}** buttons in the menu as shown above. The eKey layer is now displayed on the monitor.

> Note: Notice the square button between the On/Off buttons. If it is tallied Red it is contributing to a programme output.

eKey Resize

Once an eKey has been setup on a monitor, the user can select the Resize functions by pressing the **[RE-SIZE]** button on the GUI.

The **Resize - Key** menu has a Zoom in function and also allows the user to move the eKey layer horizontally using the **X Position** parameter and vertically/downwards using the **Y Position** parameter.
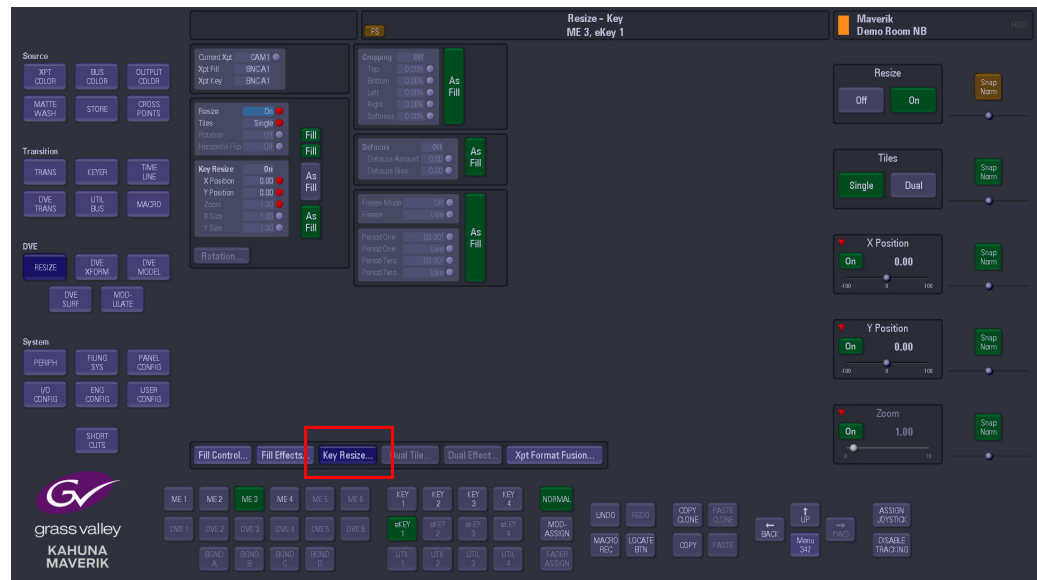
Modulate Overview

The modulation function enables the user to add modulation effects to transitions, wipes, borders, 2D effects and 3D effects. The type of modulation applied to a function is selectable and can be added to many different parameters, whether it is Global, ME Bus, ME Trans, DVE, I/O or User related.

The modulators are sorted into relevant Groups, determined by their subject matter:
Global Modulators - are used to modulate multiple parameters in a fixed relationship.
M/E Bus Group - displays modulator parameters within a Bus function, such as Transition of a Keyer.

M/E Trans Group - displays the modulates parameters within the Transition functions.

DVE Group - displays modulated parameters within a DVE function.

I/O Config Group - displays modulated parameters within an I/O function, such as Red Gamma in RGB Input Color.
User Config Group - displays modulated parameters within a User function, such as Mattes and Washes.

Global Modulators

Touch the **{MODULATE}** button to enter the **Modulators - Setup** menu.
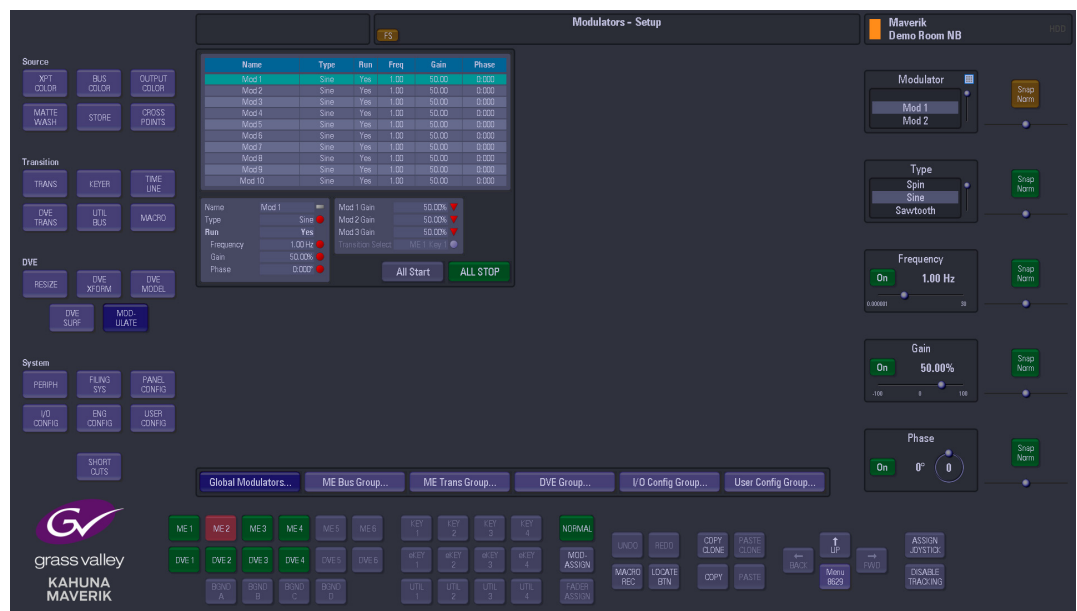
Global modulators, as mentioned earlier are used to run modulators globally across the logical switcher.
An example could be a color effect modulation that would affect all M/Es globally on the logical switcher.

Global Modulators - Parameter Controls

Name - there are 10 individual modulation setup options in this column, each one can be given a unique name, by selecting the required row using the Modulator parameter, then typing the name into the Name attacher.

Type - this is the modulation effect used, either Spin, Sine, Sawtooth, Triangle, Square, Shake, Linear Drift and Cubic Drift, Static, Bounce and Transition. Preset to start with a Sine wave modulation.

Run - allows the modulation to run.

Frequency - adjusts the frequency of the modulation, range from 0Hz to 30Hz. Preset to start at 1Hz

Gain - adjusts the gain of the modulation, range from -100% to +100%. Preset to start at +50%.

Phase - changes the phase of the modulation, range 360° plus complete turns, i.e. 5:180° this is 5 complete turns plus 180°.

An individual modulator setup can be switched **On**, by selecting an individual modulation using the Modulator parameter. Next, touch one of the On/Off buttons in the **Frequency**, **Gain** or **Phase** parameter displays.
Notice that "Yes" has now appeared in the Run column of the table.
All the modulator setups in the table can be started by pressing the **{All Start}** action button, or stopped by pressing the **{ALL STOP}** button.

The Transition Select allows the use of the transition engines to control the level of other parameters. Using the Transition modulator type it is possible to use the AUTO Trans and T Bar to control the level of a particular parameter.
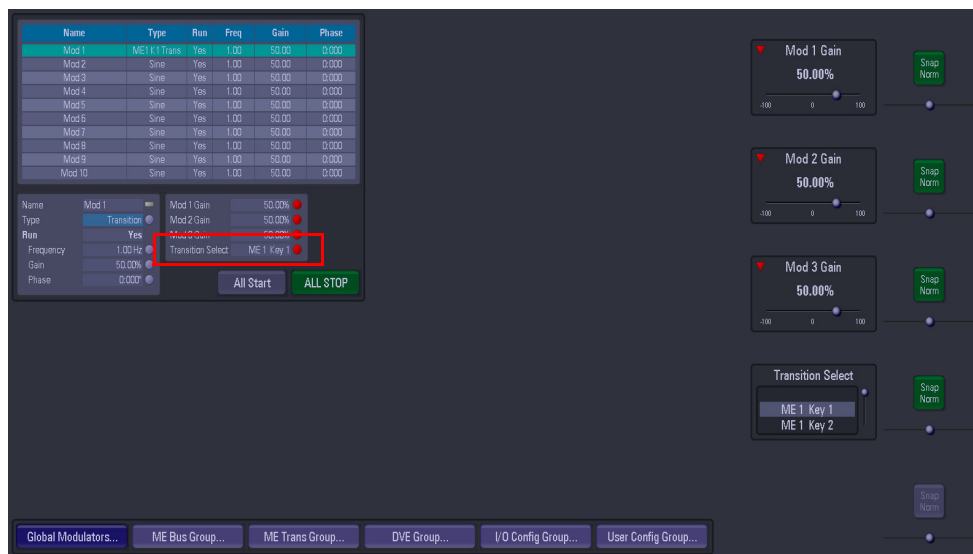
If a Transition type Modulator is attached to a 'Store Pan H position' for example, the Store is then used as a Utility Wipe Border; when the Bgnd Transition takes place the T Bar moves the picture within the Store at the same time as the wipe edge.

To choose which T Bar controls the movement of the modulated parameter, select the ME from the Transition Select area. By determining a Bgnd or Key Bus the modulation will only take effect when that Bgnd or Key bus is selected in the transition.

The modulator Gain can be used to adjust how much effect the transition engine has on the modulated parameter. Global Modulators as well as Bus, I/O Config, DVE and User Config group modulators can all use the Transition type modulator.

> Note: Modulators can also be controlled using the Transition Tbar.

Bus Config Group

This is a modulation applied to a parameter that will affect a Bus e.g. transition wipe, Bus color and Keyer parameters, and is for example applied to a Key on an M/E.
Touch the **{Bus Config Group}** menu link button to enter the **Modulators - Bus Config Group** menu.
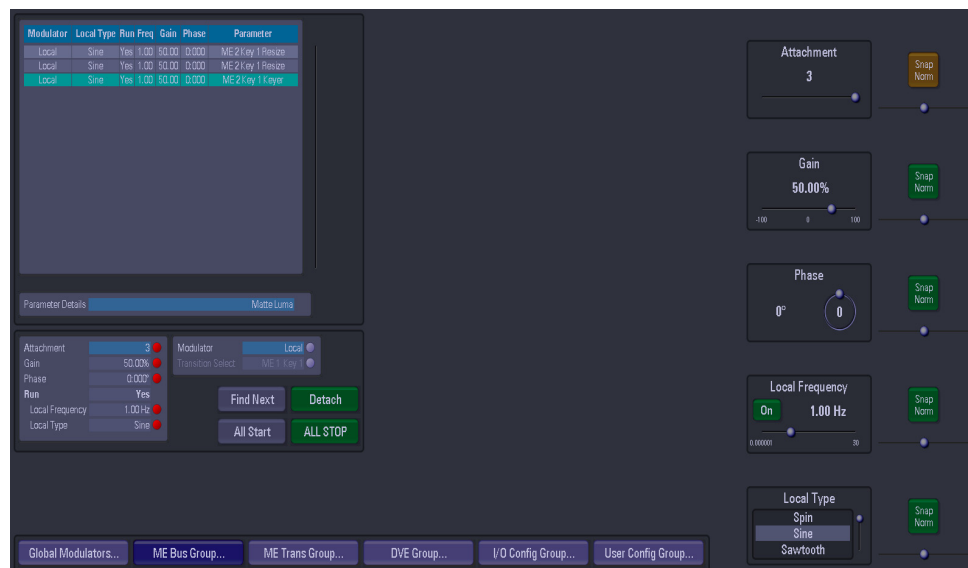
The table in this menu displays the modulation setup:

Modulator - this column will show if the modulation is Local to the Bus Config group or if it is attached to a **Global Modulators** setup (displayed as Mod 1 - 10 or named if setup in the **Global Modulators** menu).

Touch the **Modulator** attacher box (center of the menu), three parameters will appear. Use the Attachment parameter to scroll through and select a modulator setup in the table, then use the Modulator parameter to select if the modulation is "Local" to the Bus Group or attached to a **Global Modulators** setup. The **Transition Select** allows the use of the transition engines to control the level of other parameters.

Local Type - this is the type of modulation effect, notice that when the Modulator parameter is changed from Local to a Global Modulation the text in the Local Type, Run and Freq columns turns Gray and will not have any affect in the Local setup.

Run, Freq, Gain and Phase - these parameters have the same affect on a modulation setup as described on the previous page.

Local Frequency and Local Type parameters will only affect a modulation setup in the Bus Config Group.

Parameter - this column displays the Bus that the modulation effect is attached to.

Parameter Details - this named box displays the actual function that the modulation is attached to for the selected Bus modulation in the table.

All Start/ALL STOP - as described on the previous page, this function will set all the modulation setups in the table to run or stop.

Detach - this will delete a selected modulation setup in the table.

> Note: The parameter controls for Gain, Phase, Local Frequency etc. are exactly the same as the Global Modulators parameters.

ME Trans Group, DVE Group, I/O Config Group and User Config Group

These four menus below work in exactly the same way as the Bus Config Group. They all have a "Local" type modulation setup or can be attached to a Global Modulations setup.

ME Trans Group modulators are attached to Key and M/E Transitions

DVE Group modulators are attached to parameters in the DVE XFORM, MODEL and SURFACE menus.

I/O Config Group modulators are attached to parameters in the Input Color menu.

User Config Group modulators are attached to parameters in the Output Color and Mattes & Washes menus.
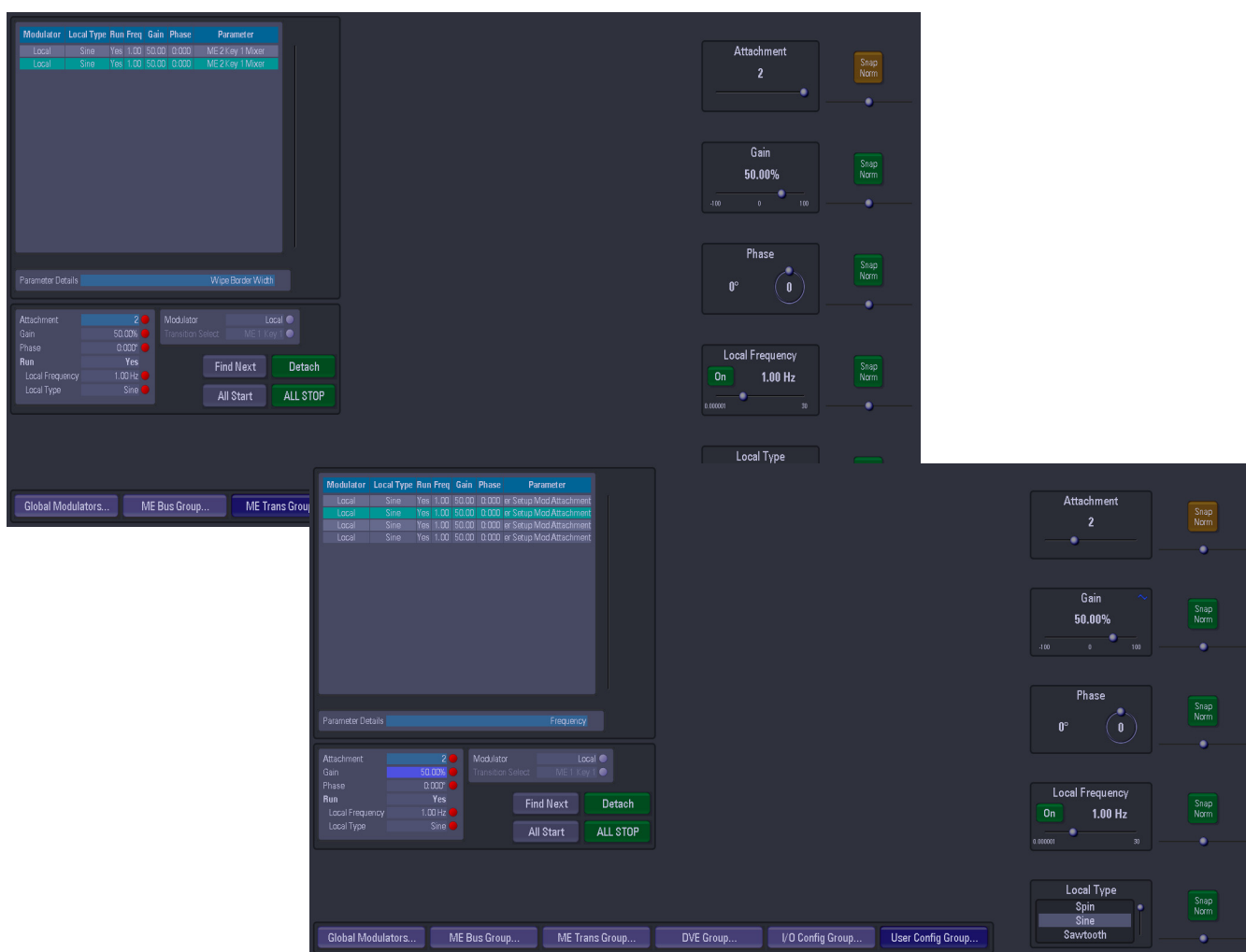
Basic How to Use Modulators

How to Use the Modulator Function
The setup sequence will follow these 3 easy steps:

1   Select the function the modulation is going to be attached to, and touch the **{MOD ASSIGN}** button.

2   Select the parameter that the modulation will be attached to, and touch the **{SNAP NORM}** button to attach the modulator.

3   Touch the **{Done}** button in the dialog box.

Select a Function

Select a Parameter to Modulate

Touch the {Done} Button

Select the function the modulation will affect, then select the parameter the modulation will be attached to.

Touch the **{MOD ASSIGN}** button, it will flash red and a dialog box will be displayed with "**Assign Modulators**" and asking you to "**Select parameter(s) to modulate**". Then touch the **{SNAP NORM}** button for the parameter you want to modulate. Notice that the selected parameter display now has a blue "sinewave" symbol top right of the box, as shown below.
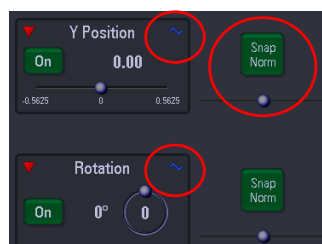
Also notice that the attacher that displays the parameter settings has turned blue as shown below.
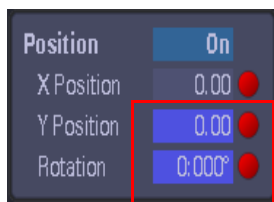
Touch the {Modulate} button to display the modulator group menu, and you will be able to see the attached parameter function in the table.

The specific modulator setup can now be adjusted using the Gain, Phase, Local Frequency and Local Type parameters.
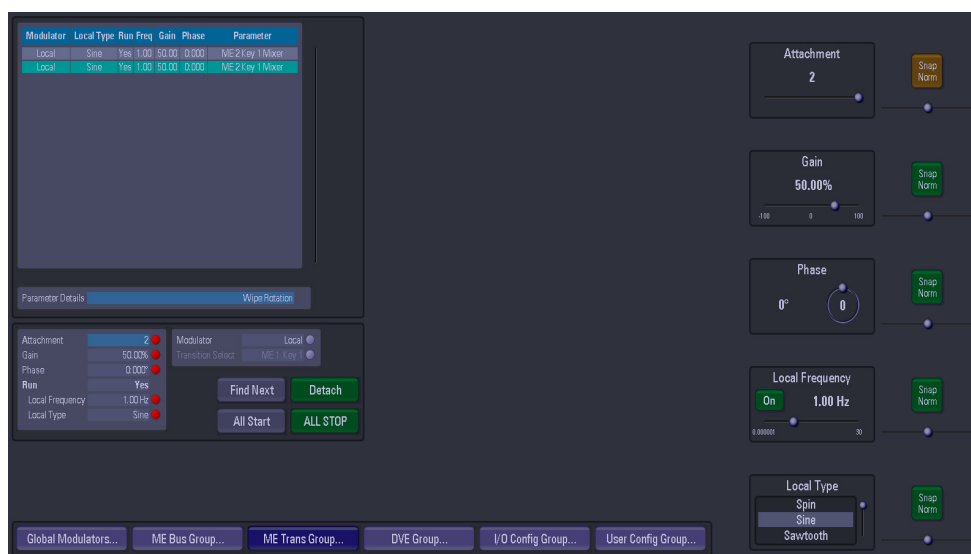
Note: If a parameter is selected and a modulator cannot be attached to it, a dialog box will appear in the menu stating that the parameter cannot be modulated.

Peripherals Overview

The Peripherals menu is used to control various external equipment; such as VTRs, Video disks, Routers, Audio Mixing Desks, Automation etc.

Touch the **{Peripherals}** button on the GUI to enter the Peripherals main menu.
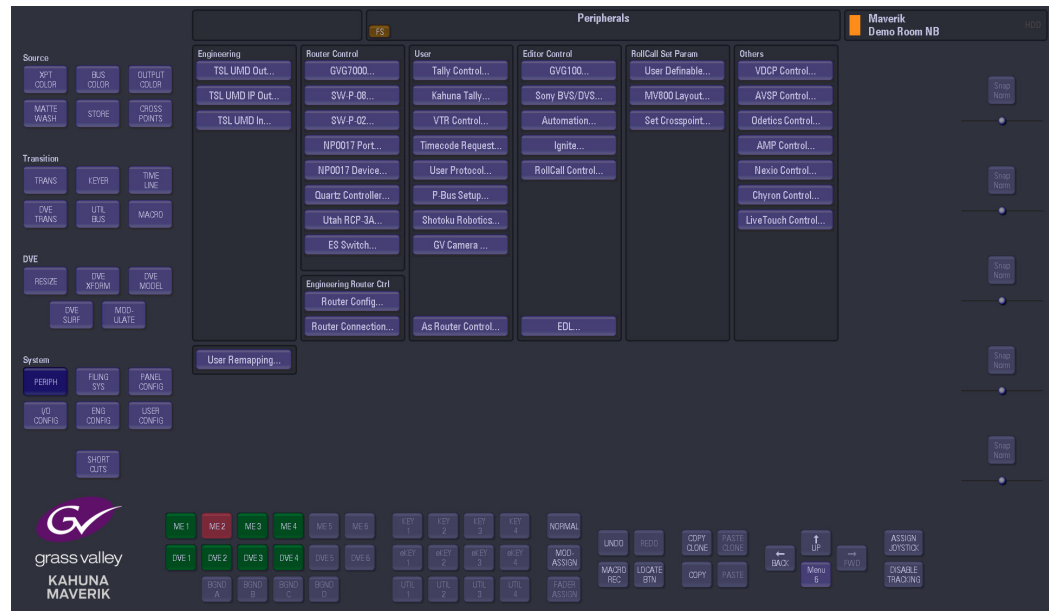
Note: Before using any of the Peripheral menus it is important to understand how the protocols are setup and assigned.

How to Setup a Protocols

The **"Engineering Config - Protocols"** menu is used to set parameters for bi-directional communication with external devices either by one of the RJ45 RS422 ports or selecting one of the IP protocol connections.
Protocols have to be setup in this menu before the Peripherals connections and functionality can be used.

There are 7 Protocol Types to choose from; Tally & UMD, Router, Playout, Editor, Camera, Audio, and Miscellaneous. Each protocol type has a number of available sub-protocols to choose from, that allows the user to connect to a large number of different types of external equipment.

The Available Protocols in their Protocol Types are as follows:

Protocol Type						
Tally & UMD	**Router**	**Playout**	**Editor**	**Camera**	**Audio**	**Miscellaneous**
Tally	Pesa CPU Link P1 Router	Sony BVW-75 VTR	GVG 100	Shotoku Robotics	Calrec	User Definable Protocol
GVG (Philips) MPK Tally	Pesa CPU Link USP Router	Kahuna As BVW-75 VTR	Sony BVS/DVS	VISCA	Yamaha	IQDSK Keyer Control
TSL UMD (Input Only)	SW-P-08 Router	BVW-75 Timecode Request	Automation	GV LDK Camera	Ember+	Loopback Test
TSL UMD (Output Only)	As SW-P-08 Router (Xpt)	AMP IP	Ignite			4K Pan and Scan
TSL UMD IP (Output Only)	As SW-P-08 Router (Src)	VDCP	RollCall Control			RollCall Set Param
GVG (Philips) MPK UMD	SW-P-02 Router	VDCP-Simple				Sage EAS
	As SW-P-02 Router	Odetics VDR Control				
	NVision NP0010-02 Router	Kahuna As VDCP Video Desk				
	Philips ES Switch Router	EVS AVSP				
	GVG 7000 Native Router	P-Bus				
	Quartz T01 Router	NEXIO Native				
	UTAH Scientific RCP-1	Chyron Graphics				
	Harris (Pass-Through)	LiveTouch				
	NP0016-00	LiveTouch Minipic				
	NP0017-00D Port					
	NP0017-00D Device					
	UTAH RCP-3					
	UTAH RCP-3A					

Serial Protocol Setup

> Note: When using the RS422 Serial protocol, depending on specifications of
> the Kahuna mainframe purchased, this will dictate how many RS422 serial
> protocol ports are active.

In the Engineering Config main menu, touch the {Protocols} menu link button.
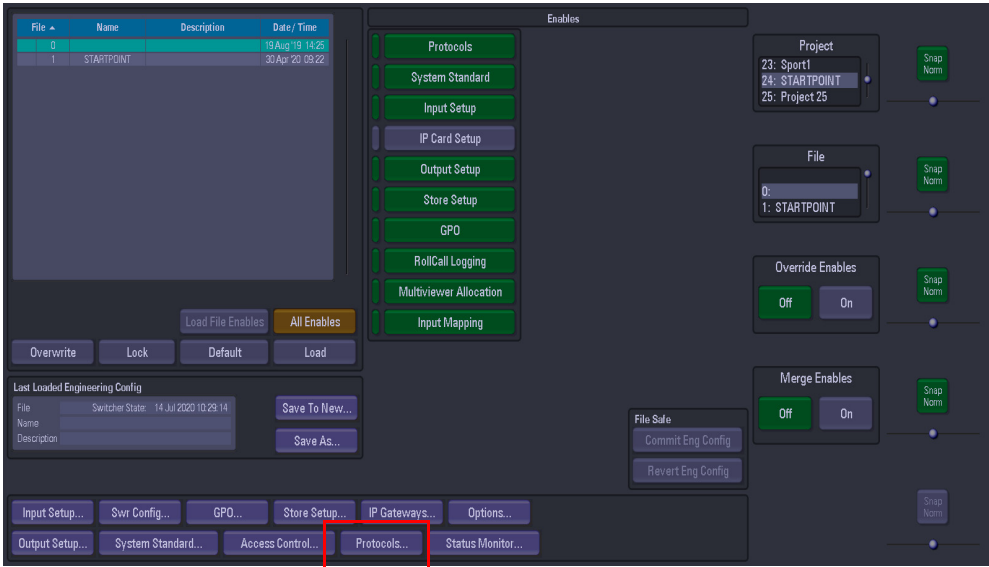
In the "Protocols menu, use the "**Protocol Type"** parameter to scroll through the protocol sets,
then use the **Available Protocols** parameter or touch the protocol you require, and then press
the **{Load}** button.

> Note: The number of protocols available to the user depends on the
> protocol options purchased with the system.

> Note: In this example SW-P-08Router protocol is being used.

After the load button is touched, the selected protocol is placed in the **Loaded Protocols** table
and a new attacher is added to the menu. The attacher displays configuration information
related to the selected protocol.

If the protocol configuration settings need to be change, touch the **{Configure}** button to
enter the "**Protocol Config**" menu.

Here, the user is able to select the type of connection that is required (Transport Type) i.e Serial
or IP, and also set user defined parameters for the protocol.
The **Default Settings** as the name suggests is the default setup for communication with an
external device. If a specific setup is needed, press the **{User}** button in the "**Settings"**
parameter. The user is now able to setup the protocol as required.

If an "IP" Transport Type is selected, for the "**IP Client Configuration**" touch the **{Edit}** button
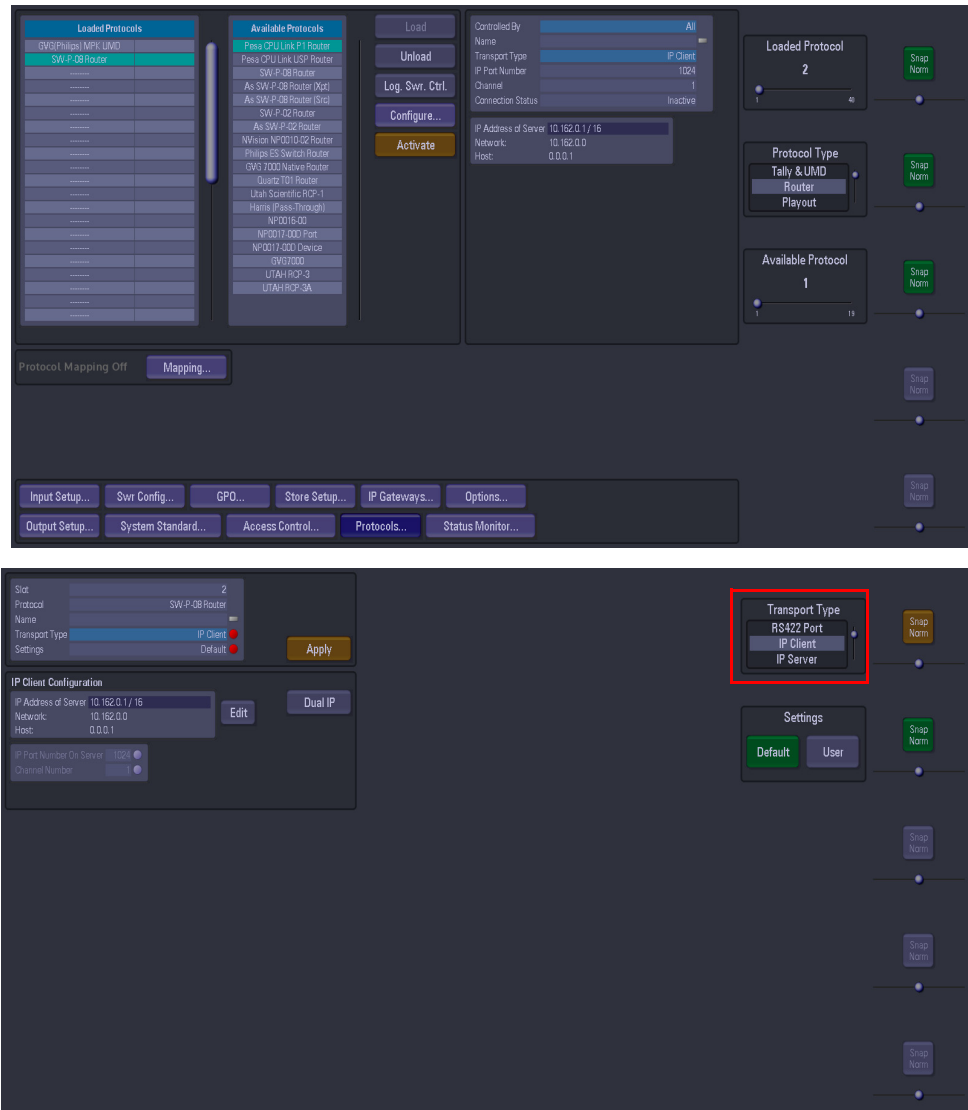
to set the IP address.

When the parameters have been set correctly, touch the **{Apply}** button. The menu will now return to the main Protocols menu.

Finally, touch the **{Activate}** button.
When using the protocol in one of the Peripheral menus, you will see the protocol that you setup in the "**Slot**" parameter.
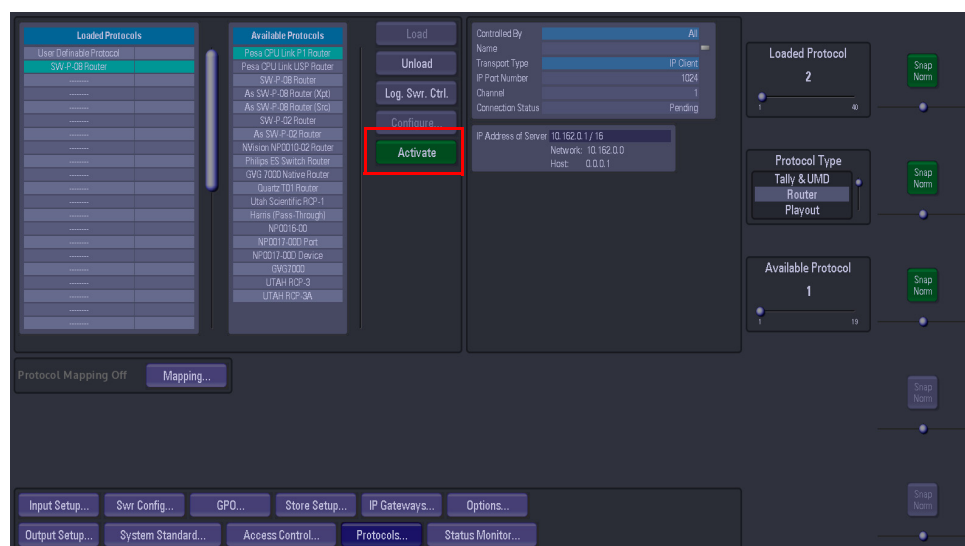
Peripherals - Engineering

TSL UMD Output Only

This peripheral is used to control and send information displayed in the Under Monitor Displays used in galleries and Multiviewers.

The protocol is connected to Kahuna by one of the RS422 ports.

Select the UMD address, then select the BNC output from the Kahuna mainframe, the user can then select if they wish to display the output name from the Kahuna system to be displayed on the under monitor display.

A tally is also displayed if the source to the under monitor display is on air.

TSL UMD IP Out Setup

This is very similar to the TSL UMD Output, but is used on IP systems. The peripheral is used to control and send information displayed in the Under Monitor Displays used in galleries and Multiviewers.
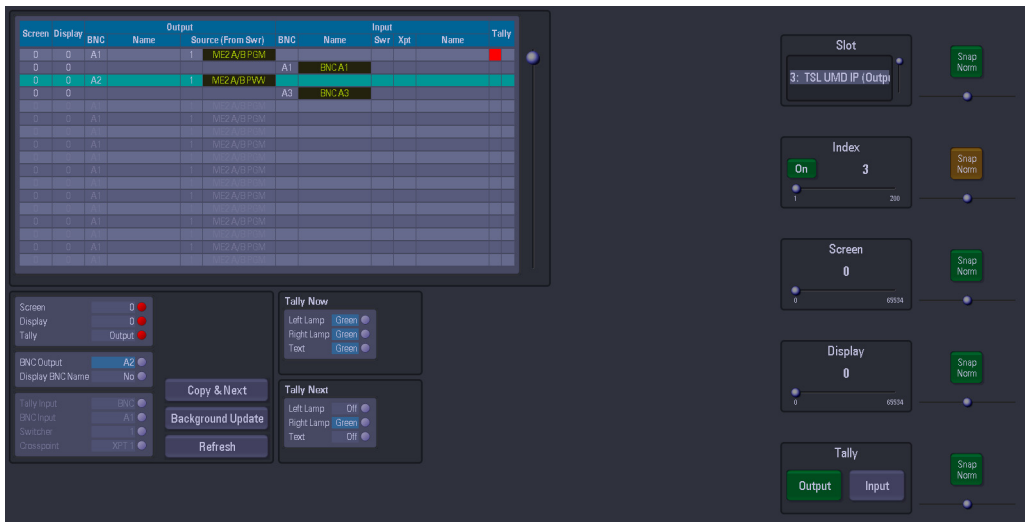
The protocol is connected to Kahuna over a network via IP Client or IP Server.

The menu has the ability to have Bus Tally as an Option for the A and B, Buses. thus allowing for the Automation XPT to always show the correct BNC name on Air (for example) when using the Automation XPT system.
This will also show the correct name when you override the Automaton from the panel by selecting XPTs manually.

Select the UMD address, then select the BNC output from the Kahuna mainframe, the user can then select if they wish to display the output name from the Kahuna system to be displayed on the under monitor display.

A tally is also displayed if the source to the under monitor display is on air.

TSL UMD In

This protocol allows Kahuna to receive source names from external devices (for example a Router) **Eng Config - Input Setup** menu allows Kahuna to use the source names.
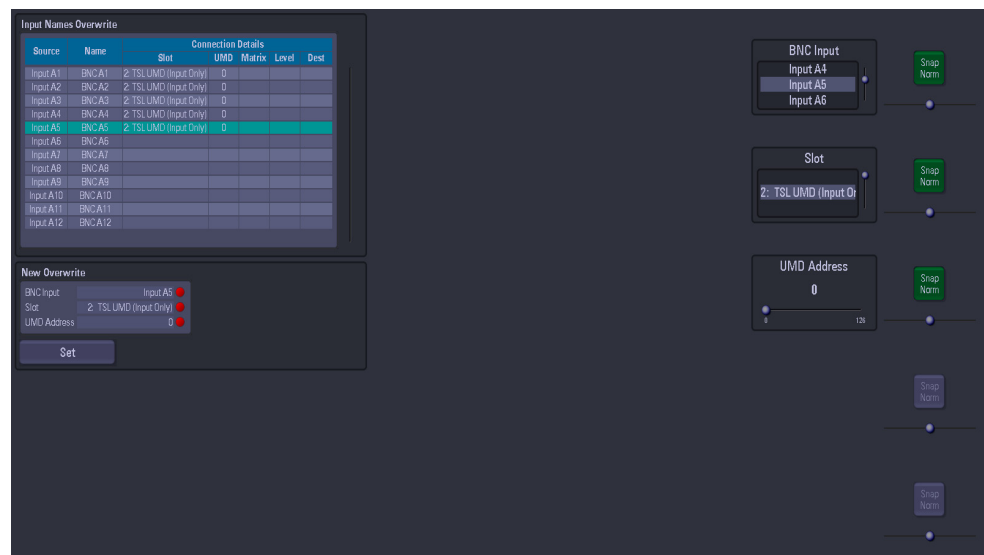
The protocol is setup in the **Eng Config - Protocols** menu, this will allow the Kahuna mainframe to communicate with the external device. Kahuna is able to receive source name information from the external device via the RS422/IP connection or the BNC, each source name is mapped to a UMD address.
From the menu above, assume a source called VTR87 is mapped to UMD address 87 and it is feeding Kahuna input 3, the name "VTR87" will overwrite the default name "BNC3"
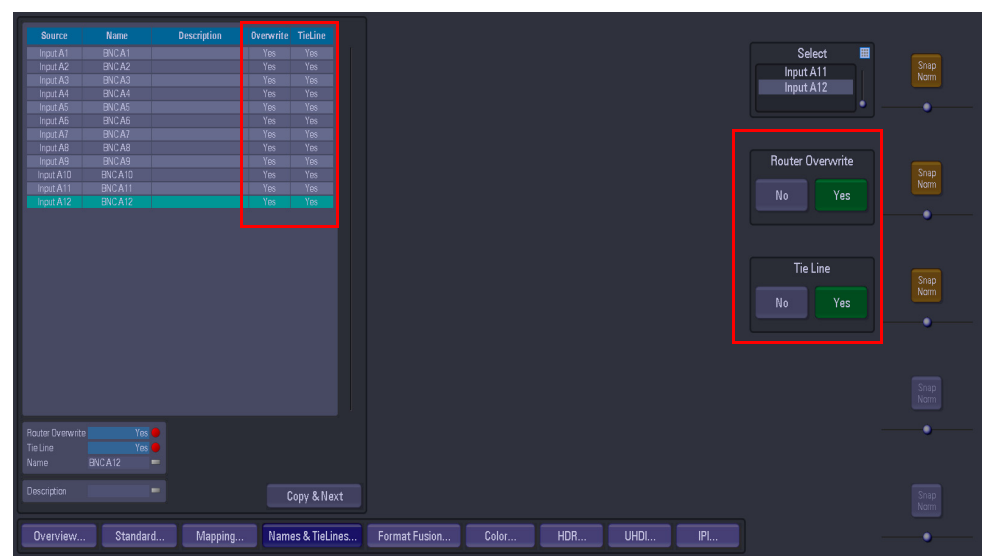
Using the **Router Overwrite** parameter in the **Eng Config - Input Setup** menu, Kahuna is able to receive UMD information from any of the BNC inputs. This information will then be displayed in the input menu's and can also be used for the mnemonic displays on the control surface for selecting sources.

Peripherals - Router Control

This function allows Kahuna to control a third party router. The menus are similar in functionality for the GVG7000 and Utah RCP-3A, and the menus for the Snell SW-P-08 through to the Quartz Controller are also similar in functionality to each other.
In the following section one example form each Router Control function will be explained.

For this example, we are going to look at the SW-P-08 Router Control Peripheral.

As SW-P-08 - Xpt
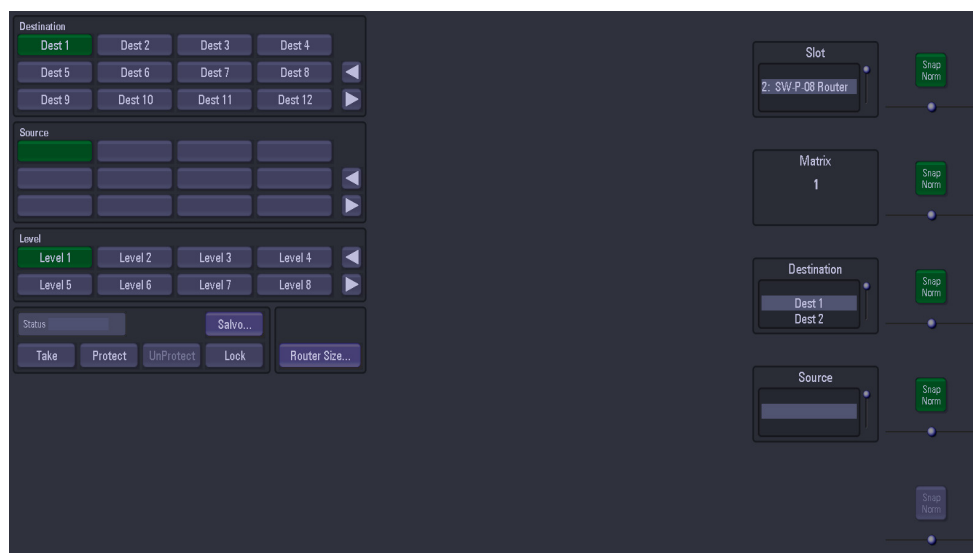
This menu enables the user to control the router Names.

When first connecting to a system controller, Kahuna will request all the names for the Destinations, Sources and Levels.

The user can then assign names to the 12 destination buttons and 12 next source selection

buttons, the level names will then also appear in the Level Mapping by Names menu.

Router Control Buttons

Take - Sets a crosspoint

Protect - protects a destination

UnProtect - removes the destination protection

Salvo Control

This menu works in exactly the same way as the previous menu.
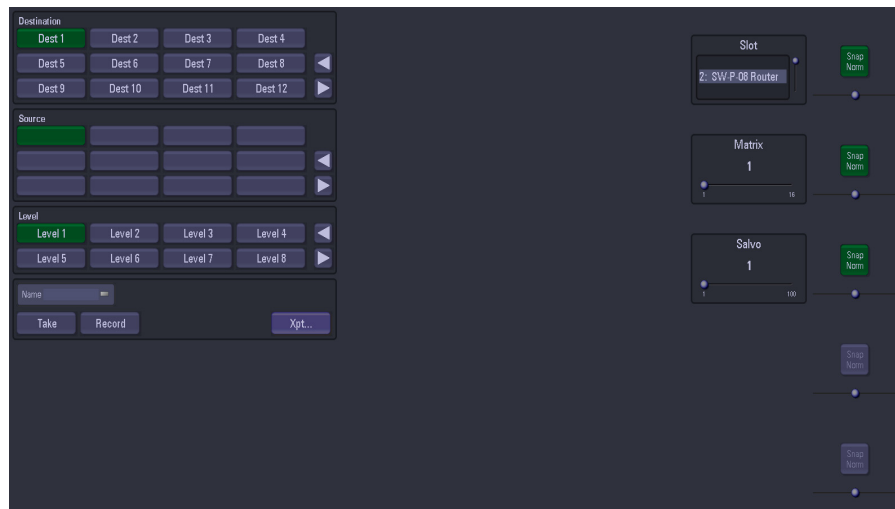
The Xpt button reverts back to the Xpt Control menu.

Utah RCP-3A

Touch the **{Utah RCP-3A...}** button, which will open the RCP-3A Status & Control menu.
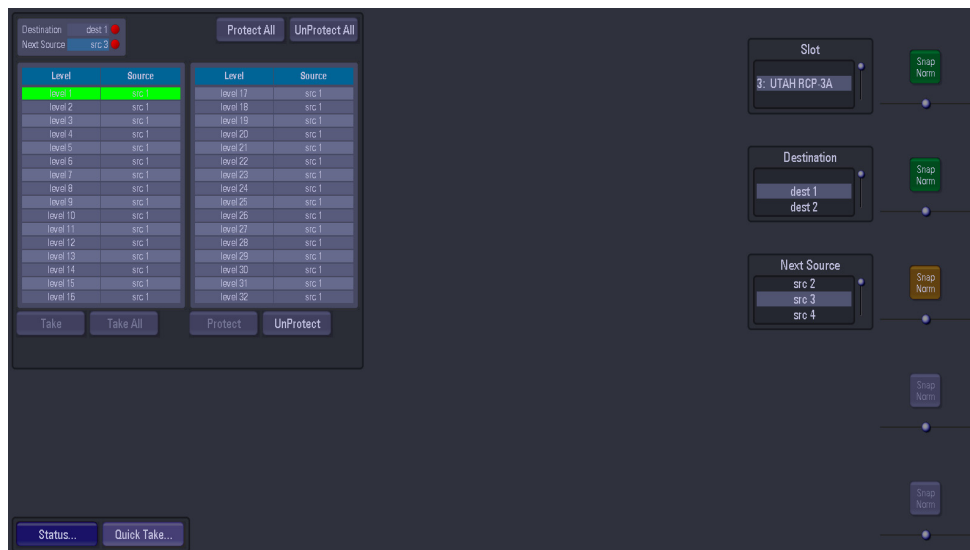
If the Router is connected the sources and destinations will be displayed as shown in the above menu.

To perform a take, select the **Source** and **Destinations** using the parameters, on the desired level and then touch **{Take}**. The Green selection indicates which level is active - which level the Takes and (un) Protects will be acted on. There can be multiple active levels selected at an time.
Alternatively, select the **{Quick Take...}** button at the bottom of the menu, which will take the user to the RCP-3A Quick Take menu as shown below.
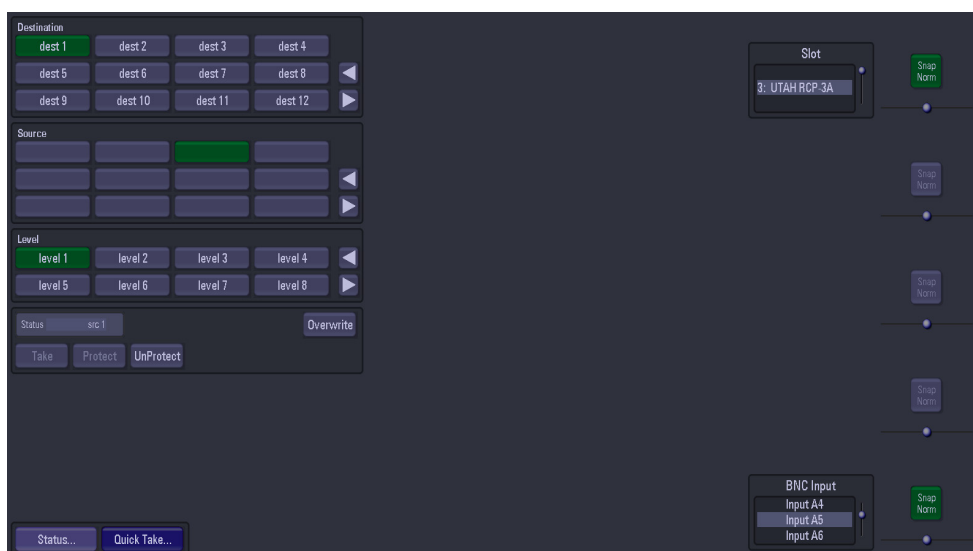
To perform a take, select the **Source** and **Destination** on the desired level and then touch **{Take}**. To lock the assignment press **{Protect}**. To Unlock press **{UnProtect}.**

Peripherals - Engineering Router Control

The menus in this section of the Peripherals menu are used to setup Kahuna to communicate with external routers. One of the features that can be used with these menus is Kahuna's new Intelligent "Tile Line" concept (this will be described later in this section).

Router Config

This menu allows the user to make changes to the way routers work with Kahuna.
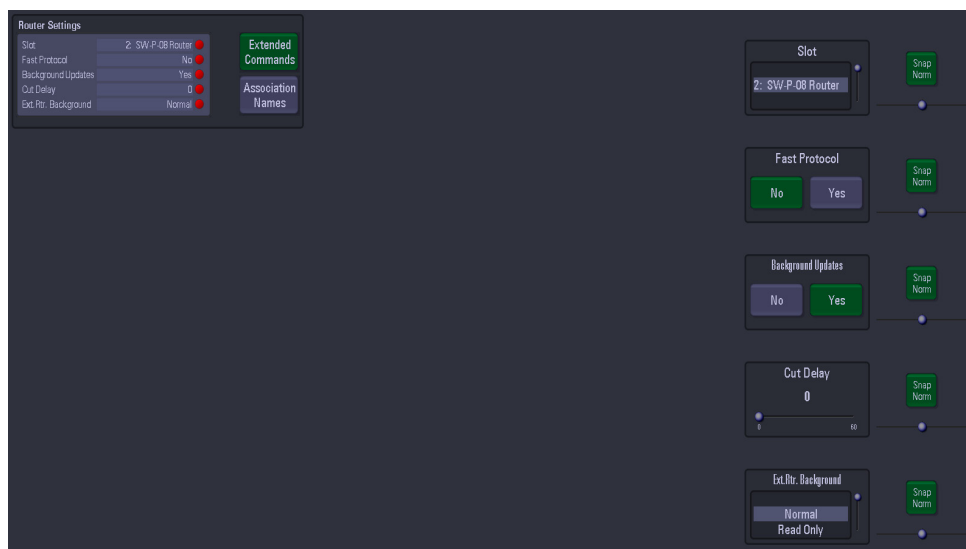
If for example a source switch on the external router is changing later than, the timing can be adjusted. This will delay the cut on the to ensure the router switch is complete.
Adjust the Cut Delay until clean switching is achieved.
For routers that use the SWP08 protocol the Fast Protocol selection can be enabled. This sends out multiple commands per video field. It will depend on the implementation of SWP08 whether this mode works.

Ext Rtr. Background:-
- **Normal** - will send Xpt Take requests and Source Name requests.
- **Read Only** - will stop Xpt Take requests but continue Source Name requests.
- **Slow Read Only** - will stop Xpt Take requests but continue Source Name requests.
- **V.Slow** - will send Xpt Take requests and Source Name requests at a very slow rate.
- **V.Slow Read Only** - will stop Xpt Take requests but continue Source Name requests at a very slow rate.
- **Off** - will stop both Xpt Take and Source Name requests.

Router Connections

Here the physical router outputs (Including Matrix and Levels) can be mapped to the physical Kahuna inputs.
Each of the input sources has to be setup individually, as each one is setup, touch the **{Set}** button
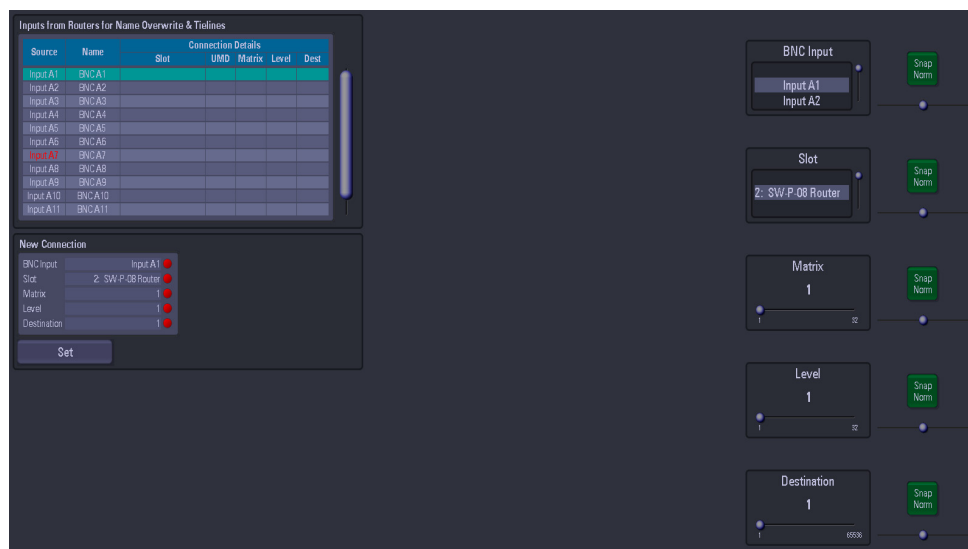
Matrix - this is the router connected to Kahuna.

Level - this refers to the different levels within a router, video, audio and other.

Destination - this is the output from the router

External Router - Practical Application

Kahuna has the mechanism to expand the number of sources coming into the mainframe using an external router. This is primarily due to a system setup running in UHD. Using this new feature, the number of sources to be used with the Kahuna, are expandable up to the size of the upstream router.

Kahuna Intelligent Tie Line Concept

Kahuna deploys an intelligent "Tie Line" approach, the desired external router outputs (destinations) are connected to Kahuna inputs. These inputs on the Kahuna and destinations from the Router are treated as "Tie Lines". Each Tie Line acts as a floating video bus between the router and Kahuna, they are intelligently assigned and used as required.

Source selection on any Bus is transparent to the operator, regardless form where the Xpt is being made, i.e. in the external router, or in the Kahuna itself.

The Kahuna software knows what physical inputs / Tie Lines are allocated and what are not being used on a bus. Kahuna then assigns the Physical input /Tie Line to the desired Bus upon a source selection. Kahuna updates the upstream router's destination /Tie Line with the selected source.

Source selection on any Bus is transparent to the operator. Once setup, the operator sets the desired router source by selecting the appropriate router XPT on the required bus. The selection on the external router and the Tie Line path into the Kahuna is automated.

Software Version:

Requires V7.7r1 software onwards

How many Tie Lines?

How many Kahuna inputs do you need to convert to Tie Lines? This is entirely dependant on a few external factors, such as:

How many inputs available on the Kahuna (max number shown below):
- HD = 120 Tie Lines
- UHD = 30 Tie Lines
- How many router destinations are available.
- How many router sources need to be selected on Kahuna at any one time.

For example:
If the user wants to select different external router sources on the A and B bus of ME2 this would require 2 Tie Lines.

For HD this would require 2 router destinations and 2 Kahuna inputs.

For UHD this would require 8 router destinations and 8 Kahuna inputs.

If the user requires external router sources on the A and B bus plus Key 1 and Key 2, this would require 4 Tie Lines.
In summary: Each different external router source selected simultaneously requires a Tie Line. Each Tie Line requires one router destination and Kahuna input in HD, or 4 router destinations and 4 Kahuna inputs in UHD.

Note: If at all possible, it is recommended that the user creates more Tie Lines than are actually required. This gives some redundancy and reduces the risk of the system running out of available Tie Lines.

Setup

Protocol Setup

To setup the protocol, go to the **Eng Config - Protocols** menu. Use the "**Protocol Type**" parameter to select "**Router**", then, use the "Available Protocol" parameter to select the required protocol. For this example, "**SW-P-08 Router**" is selected. Touch the **{Load}** button to add the protocol to the "**Loaded Protocols**" table.
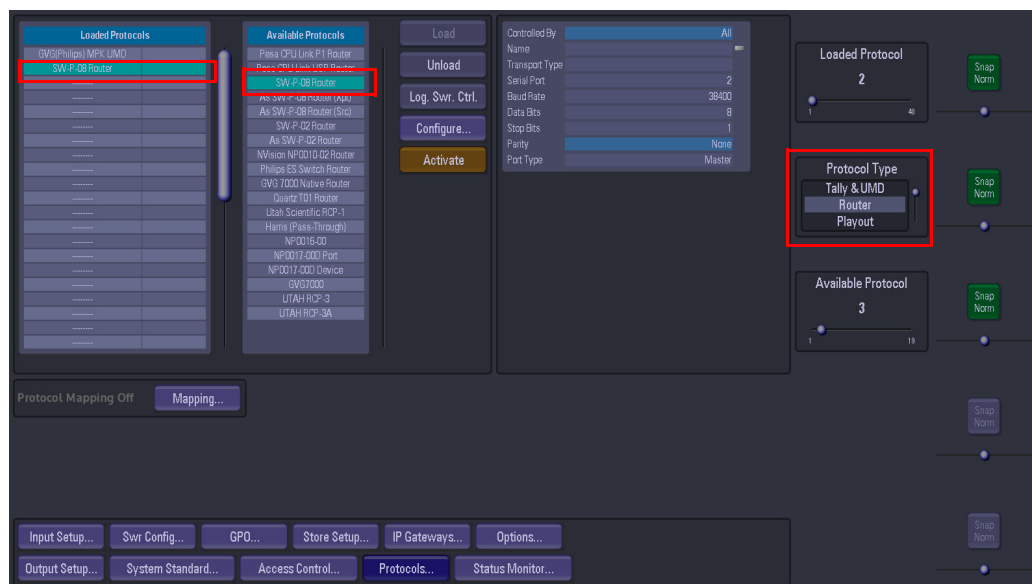
Next, configure the protocol so that Kahuna can communicate with the router. Touch the **{Configure…}** menu link button and the "**Protocol Config**" menu is displayed. Use the "**Transport Type**" parameter to select the communications transport type, then, setup "IP Client"?
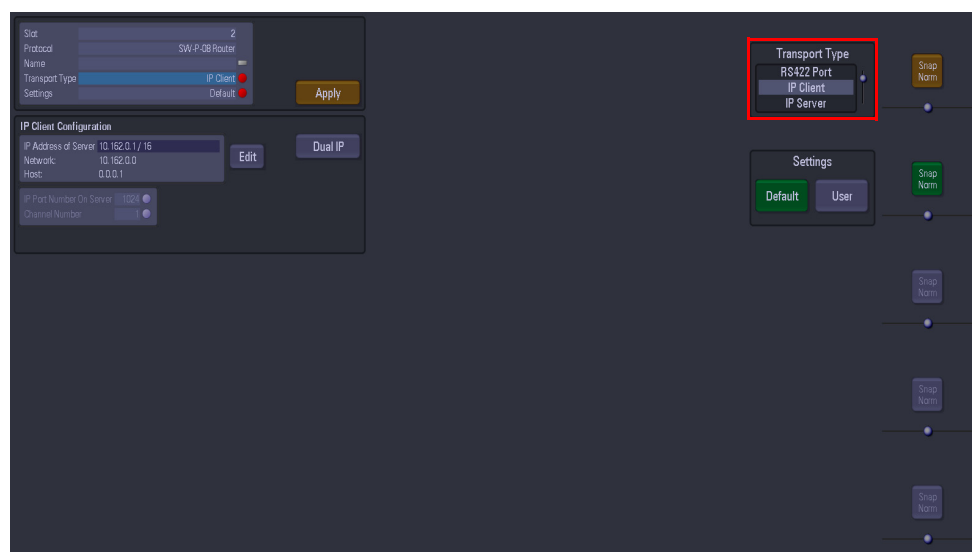
Setup the "**IP Client Configuration**" settings, touch the **{Edit}** button to enter the IP address of the server. Once setup, touch the **{Apply}** button.

You will be taken back to the Peripherals main menu. Finally, touch the **{Activate}** button to

activate the protocol.

Setting Up Names and Tie Lines

Next, go to the "**ENG Config - Input Setup - Names & TileLines"** menu.
In this menu, select the BNCs that where set to connect to the router destinations in the "Peripherals **- Router Connections"** menu and set them to "TieLine **= Yes"**. Do this for all the inputs that will become Tie Lines from the router.

> Note: For inputs that are set as "TieLines", it is recommended that the "Source **Standard"** parameter (in the **Eng Config - Inputs** menu) is set to "Auto Standard" and the "Color **Correction"** function is set to "Off". If color correction is required then it should be done on the external router XPT.

> Note: It's recommended that sources which are off standard (and therefore requires format conversion) do not come via Tie Lines if hot cutting is required.

Make sure at this point to "Overwrite" or "Save" the ENG Config setup.

Peripherals Setup
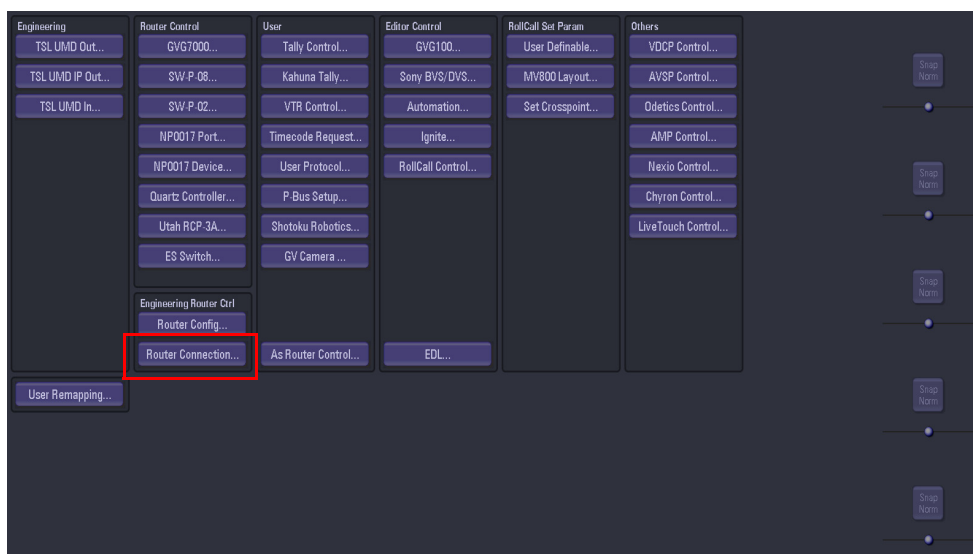
Touch the **{PERIPH}** button to enter the "Peripherals" menu.

Then select "**Router Connections**". Here the physical router outputs (Including Matrix and Levels) need to be mapped to the physical Kahuna inputs. These connections will form the "Tie Lines".
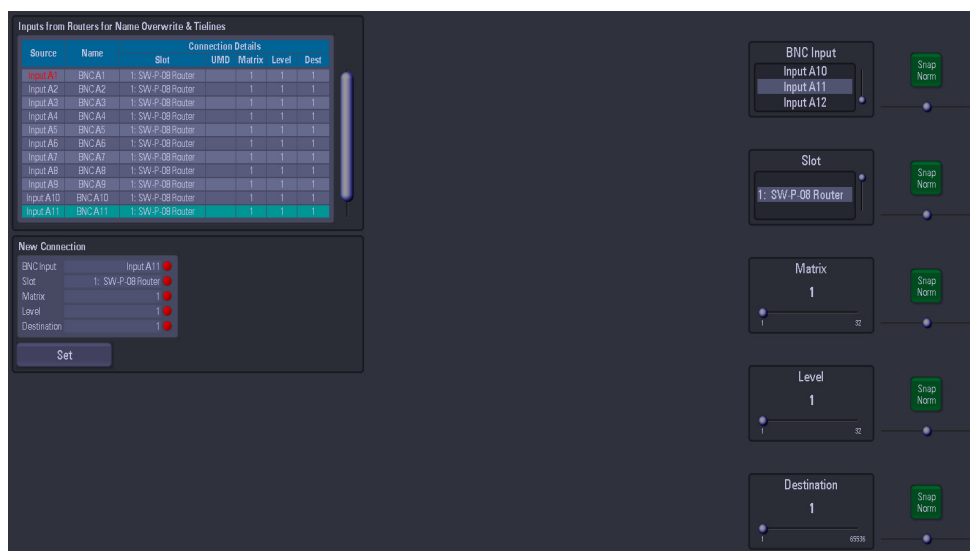
After each router connection row is set, touch the **{Set}** button.

Setting up the User Config - Crosspoint Mapping - External Router configuration

In the Crosspoint Mapping menu, touch the {External Router…} menu link button.

In the "External **Router"** menu, select free Xpts that are not being currently used, there are a total of 160 variable Xpts available. Each external router source required on the Kahuna will need its own router Xpt.

Use the "Crosspoint" parameter to select the required "Xpt" and then touch the "Fill **Source"** attacher to enable the parameters and set the "External" parameter to "**On**"

Touch the attacher below the "Fill **Source"** attacher, then use the parameter controls to set the "**Matrix, Level and Source"** for the selected XPT (originally set in the "Peripherals **- Router**

Connections" menu).

> Note: If the source is UHD set the "UHD" to "Yes".
> When in UHD mode the 4 quadrants or streams from the router have to be
> consecutive.

If the router has its sources and destinations ganged as UHD then set "**UHD Router"** = Yes. This differentiates between the control protocol setting 4 router Xpts (un-ganged) or just the first router XPT (ganged).

"**Name From"** - Router means the name is fed into the Kahuna from the external router (should the protocol allow this).
"**Name From"** - Crosspoint uses the internal XPT name as set in the User **Config - Crosspoint - Name** menu.

Repeat the above for the "**Key Source"** for the Xpt if required. Otherwise it's recommended to set the Key source to black or white for the external router XPT.

Make sure at this point to "**Overwrite**" **or** "**Save**" the User Config.

Operation

The Router Xpts can be mapped to the buttons on the control panel as per normal using the Panel Config - Button Maps menu.
The operator just selects the router XPT as per any other source and its fed via the Tie Lines from the external router.

> Note: If too many router sources are selected for the Tie Lines available the following warning is displayed

"**Insufficient Router Tie Lines"**

In this instance either extra Tie Lines need to be added, or router XPTs deselected from buses if not required.

Timing

If the source switch on the external router is changing later than Kahuna, the timing can be adjusted. This will delay the cut on the Kahuna to ensure the router switch is complete.

In the "**Peripherals - Router Control - Router Config**" menu, adjust the "**Cut Delay**" until clean switching is achieved.

For routers that use the SWP08 protocol the Fast Protocol selection can be enabled. This sends out multiple commands per video field. It will depend on the implementation of SWP08 whether this mode works.
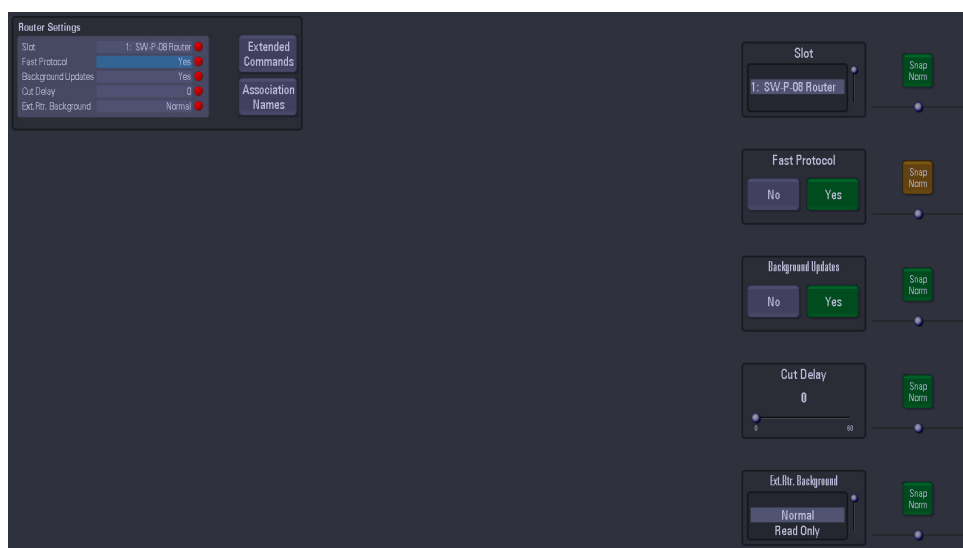
Peripherals - User

Tally Control

This menu allows the setup of a Tally serial port that is connected to an external devices. Tally protocol supports 128 Source IDs.
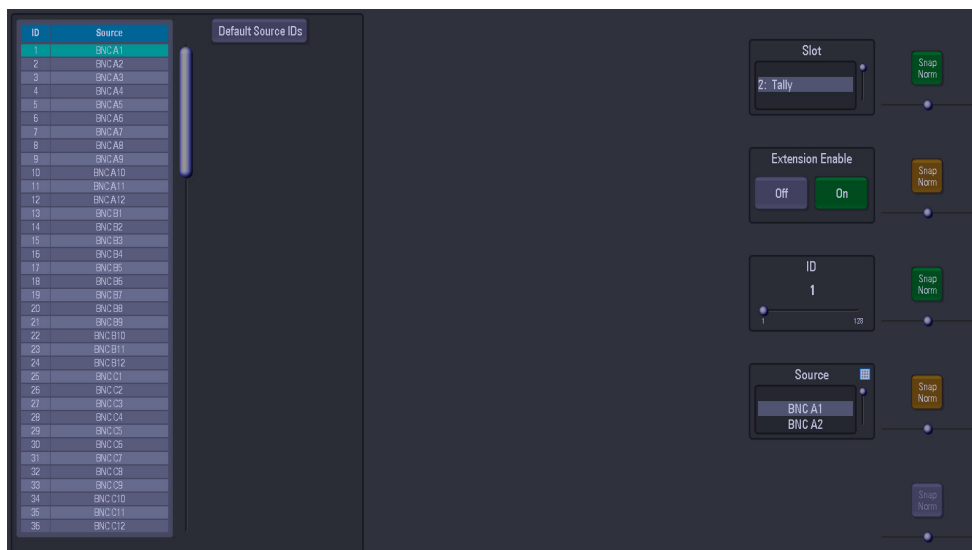
Slot - selects the protocol that is currently being used

Extension Enable - this enables the Grass Valley extension in the protocol

ID - 1-84 are for BNC inputs and 85-128 are fixed, therefore greyed out.

Source - is the 120 BNC inputs, 84 Source IDs are not enough. So the users have to "choose" which 84 out of the 120 BNCs they want to tally.
Any BNC that has not been assigned, an ID will not be tallied.
Default Source IDs button will reset the mapping table to be one to one mapped, i.e. ID 1 is BNC 1, ID 2 is BNC 2 etc.

VTR Control

This menu will allow control of VTR's connected via the RS422 ports.
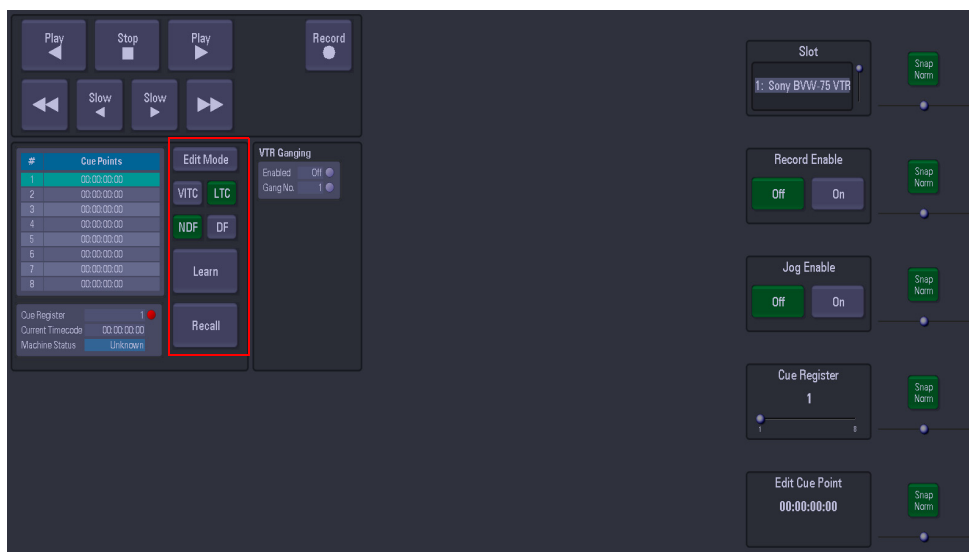
Select the device using the "Slot" parameter. The status of the connection will be displayed in the "Machine Status" parameter. Use the standard controls to **Play, Fast Forward/Rewind, Cue** or **Record** the material on the device.

When in **Edit Mode** Cue points can be set up, which can be controlled directly from this menu or can be saved to a button on the panel as a macro.
When selecting **Edit Mode** the Edit Cue Point will stop and you can manually adjust the Timecode to reach a particular frame. Pressing Learn will record that as a Cue point and add it to the list. Turn off Edit Mode until you are ready to Recall this point.
To Recall a Cue point, select it in the list and press **Edit Mode** and press {Recall}. You will notice the VTR will now scroll to that Timecode and wait for further instruction.
Cue Register will scroll through your list of recorded Cue Points.

{VITC} - Vertical Interval Time Code
VITC assigns a specific time in hours, minutes, and seconds to each vertical blanking interval in a video recording, along with a frame number. The time code can be used to start a recording at a certain chronological time (such as 5:00:00 p.m.), or it can be used to keep a playback machine synchronized with a master time source. The former application might be used by a home television viewer, while the latter application would more likely be used by a broadcaster.

{LTC} - Longitudinal Time Code
LTC is recorded along the length of the tape in the form of a modulated audio signal. The signal may be recorded on a spare audio channel or, in the case of professional equipment, on an "address track" available for just this purpose.

{NDF} - Non-Drop-Frame Format

{DF} - Drop-Frame Format

The difference between the two is that with Drop-Frame format the frame address is periodically adjusted (once every minute) so that it exactly matches real time (at the 10 minute mark), while with Non-Drop-Frame format the frame address is never adjusted and gets

progressively further away from real time.

VTR Ganging - this allows the ability to "GANG" Roll up to 4 VTRs.

The Jog Enable function can be assigned to the Joystick on the control surface.

This can be permanently assigned to the joystick by pressing and holding of the **[MEM]** button, either on the Joystick. With the MEM enabled the Joystick will return to the VTR Jog Shuttle.

User Protocol

This function will allow the user to type in an ASCII or Hex command/message and send it out to a serial port.

Slot - selects the serial port that will be used to send the commands

Index - the index number in the table for the selected command

Input Mode - selects between ASCII or HEX as a command form.

Command - command code written by the user. When in ASCII mode, Kahuna can be made to also send out two special characters.

To send a carriage return character type "<cr>" and "<lf>" for a line feed character

Length - command length

Name - name (function) given to the command data.

P-Bus Setup

This menu allows the control of Peripheral Bus Interface Boxes that can be connected to the serial ports on the Kahuna mainframe. The P Bus boxes have various external devices connected to them such as VTRs, cameras etc. The P-Bus boxes when "daisy chained" allow more than one device to be controlled through one serial ports on the Kahuna mainframe, this allows up to 24 P Bus boxes to be controlled.
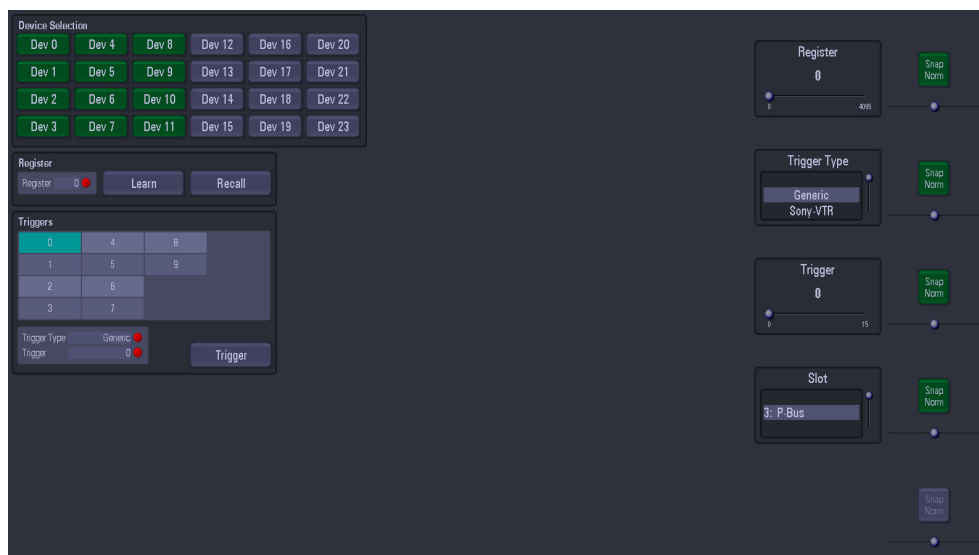
Register - is a store for the setup and position of the P Bus device, 4096 registers are available. For example, the start point on a VTR tape can be set in a register by selecting a register number at a certain point relating to the time code then pressing the {Learn} button. {Recall} will wind the tape back to the start point again which relates to the register point.

Trigger Type - this is a selection of devices that are pre loaded on to the mainframe hard drive with the trigger functions setup ready to use, the trigger settings for each device are displayed in the Triggers matrix in the menu. Scroll through this parameter and observe that the triggers will change for each device selected.

Trigger - selects one of the 16 trigger options in the Triggers matrix

Button Controls

Device Selection - Touch one of the 24 (0 to 23) available Device Selection buttons to control up to 24.

Learn - will learn an action from an external device and set the action to a register point

Recall - will recall the "Learned" action to the selected register point

Trigger - the Trigger facility allows the switcher to be used to control various functions of the connected device such as Play, Stop, Slo-Mo or Reverse Play.

Shotoku Robotics

This function allows Kahuna to communicate with and control a Shotoku robotic camera heads using an IP Server protocol.

Using the Shotoku Robotic Peripheral Controls

This function is used to control Shotoku Robotic Camera Heads.
In the "Home" menu, touch the **{Peripherals}** menu link button, then in the Peripherals menu, touch the **{Shotoku Robotics}** menu link button.
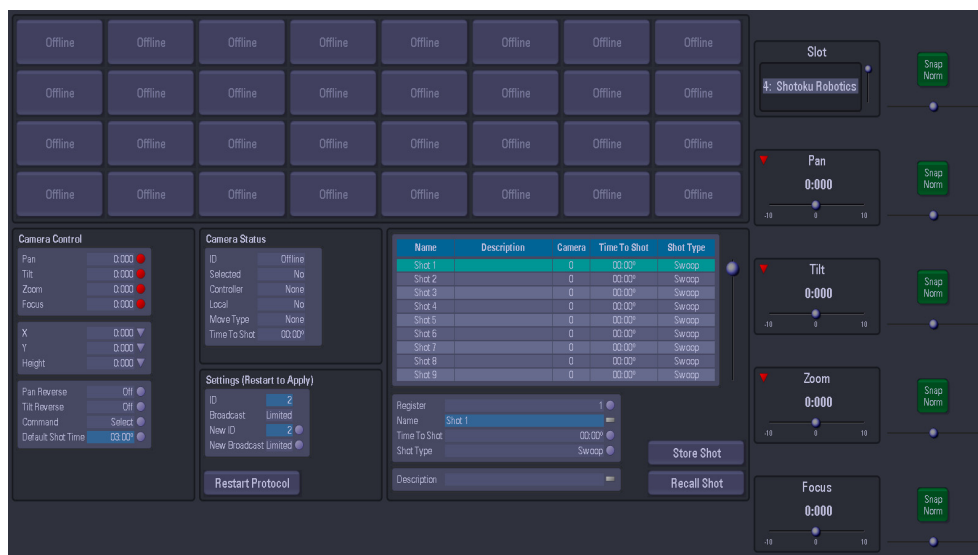
Shotoku Camera Control

The opening menu will display that the Shotoku Robotics protocol is active (as shown below).
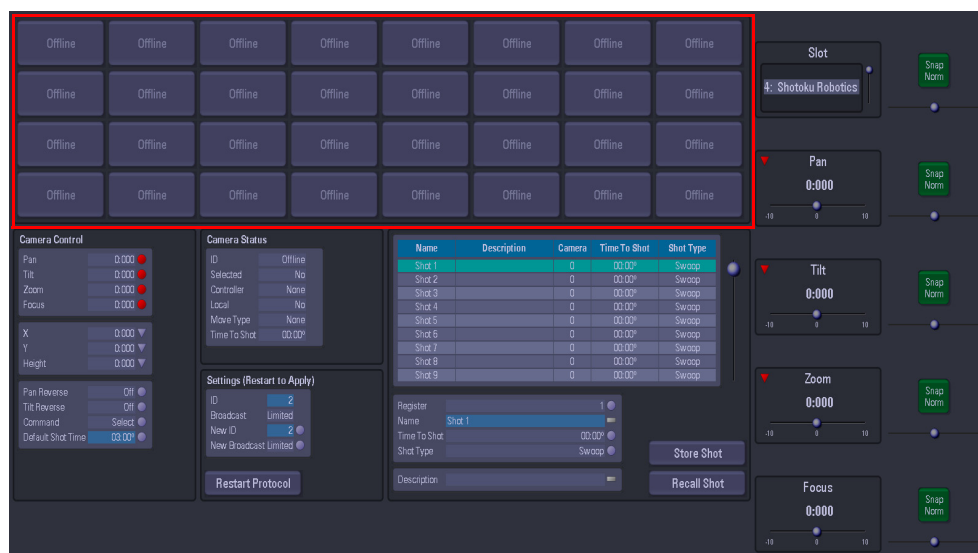
The 32 buttons in the top half of the menu are control buttons, they display the current cameras that are on-line (when active, they will light up). They can be used along with the "Command" parameter to Select, Detach and Grab cameras. The user can select a device by touching one of the Camera Control Buttons, making sure that the correct parameter controls

is selected for the type of device, i.e. Pan, Tilt and Zoom.

> Note: Each control button can have a number of commands and attachments, so the cloning of camera control buttons is recommended.

Pan, Tilt and Zoom - move the camera as described, as soon as the attachers is touched the selected parameters can now be attached to the control surface joystick (if available).

Height - adjusts the height of the camera pedestal

X, Y and Focus - work in the same way as the parameters above and are selected by touching the attachers, and selecting **X, Y & Focus**.

Command - makes the number button select that camera for controlling. *Detach* makes the number button deselect that camera.

Default Shot Time - The default time entered for camera shot storage control.
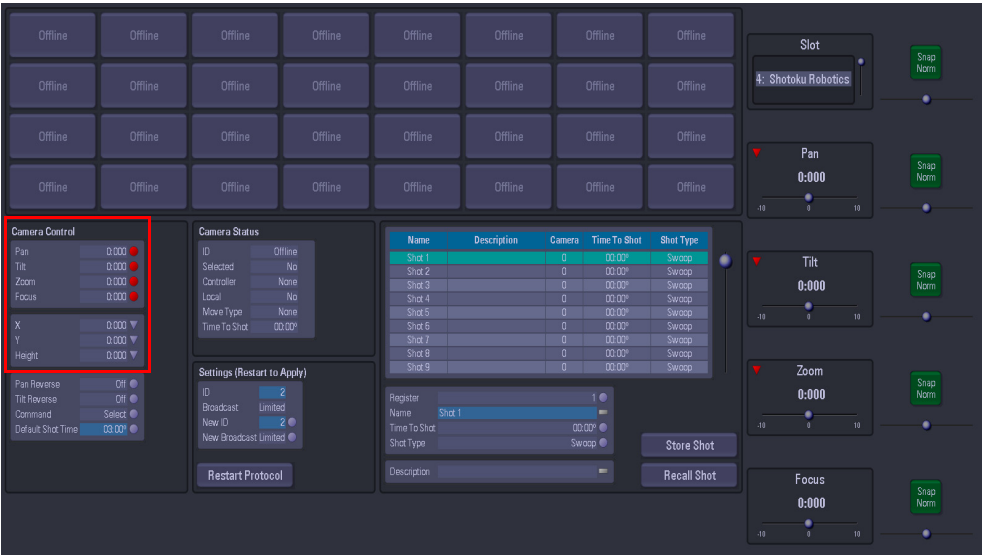
Camera Status Menu Link Button

The menu displays the camera head connection status, when connected to either the Kahuna system or the Shotoku Robotic camera head control panel.

ID - this displays the number of Robotic Camera heads that are connected and can be controlled,

Selected - this displays if the Robotic Camera heads are selected and active

Controller - this displays a unique number for the controlling device, for example, the Shotoku Control panel could be Controller ID 1, and Kahuna could be Controller ID 2 depending which Kahuna ID value is entered by the user.

Local - this indicates if the camera head is currently under local control.

Move Type - this shows the 'shot type' of the current move. This will only display something during the shot recall.

Time To Shot - if a camera head has got a preset position setup in one of the Registers (shown later), this is the time that the camera head would take to move into that preset position.
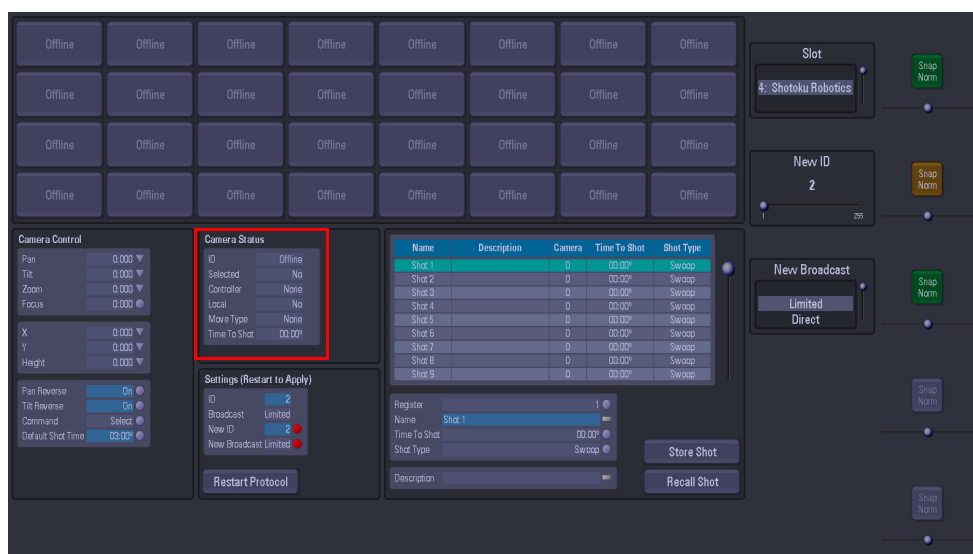
Settings Menu Link Button

ID - A unique ID set as the controlling device, when online this field will be greyed out.
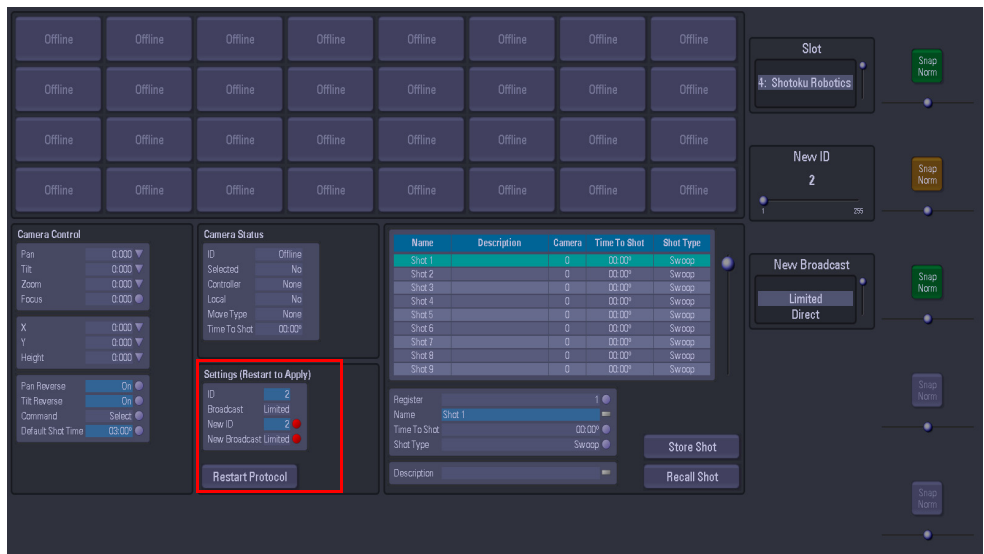
The user can manually select which camera head they wish to use by touching one of the 32 available buttons.

Note: The camera head can only be selected if it is deselected on the Shotoku controller.

Camera - Shots Menu

This menu allows the user to store **{Store Shot}** up to 100 recorded robotic camera head positions into registers, and recall them **{Recall Shot}** at any time.

Store Shot registers
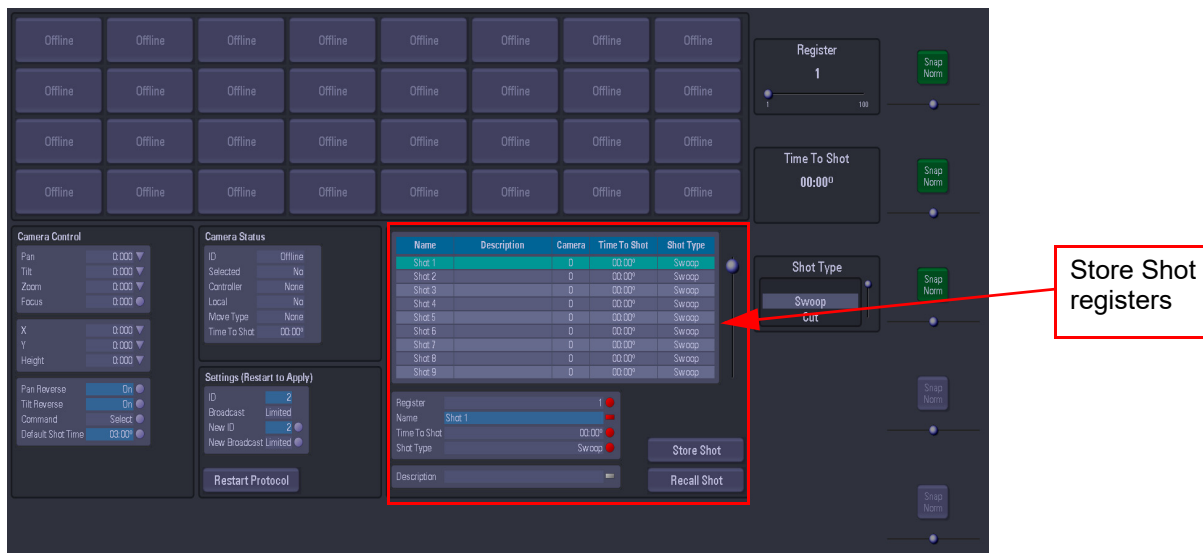
Using the Store Shot

To use this function, the user will have to go back to the Camera Control Menu and touch either the Pan, Tilt, Zoom or X, Y, Focus attacher (depending on the type of camera head used) then press and hold down one of the 4 **{MEM}** buttons located next to the joystick. This will allow the user to move the camera head using the joystick whilst in the Camera Shots menu.
Go back into the Camera Shots menu, select a camera head by pressing one of the available buttons (in the top half of the menu), the button will turn Green when selected. Next use the joystick to position the camera head, select a register position in the table, and then press the **{Store Shot}** button.
The stored position can be recalled by scrolling to the required "Shot" and pressing the **{Recall Shot}** button.

Store Shot Table

The table displays the Name of the Shot (this can be altered using the Name attacher below the table), the Description (again, this can be given a name using the Description attacher below the table), Camera ID, this is the selected camera head when the Shot was saved and Time To Shot is the time that the camera head takes to move from its current position to its saved position in the selected register.

Touch the **Name** attacher twice and the on-screen Keyboard will appear, allowing the user to enter a new name for the stored shot.
Touch the **Description** attacher twice to enter a description for the stored shot.
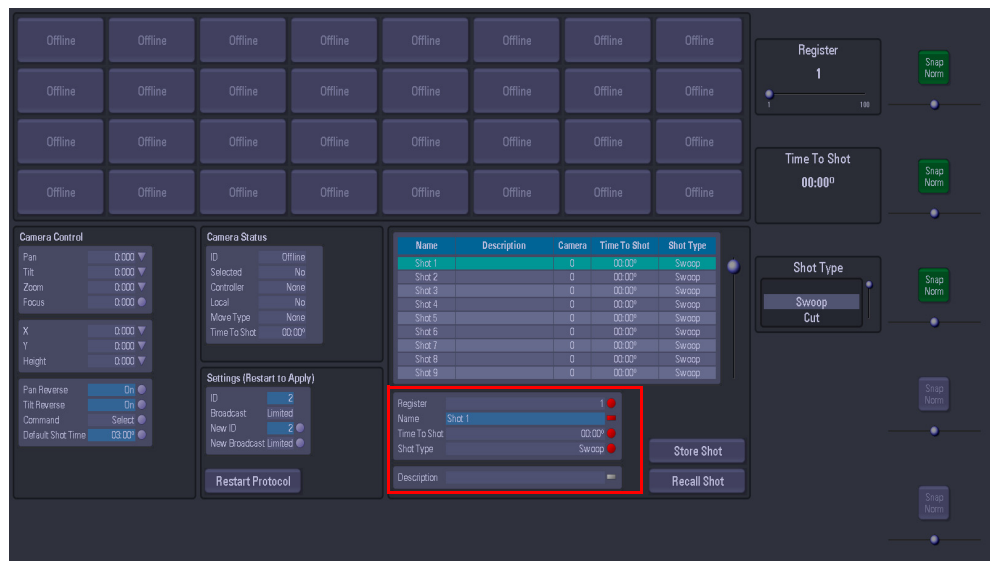
Register - Scrolls through the table.

Name - the name of the Shot.

Camera - will select one of the available camera heads, use either the parameter control or press one of the buttons in the menu.

Time To Shot - this changes the time that the camera head moves from its current position to its saved Store Shot position.

Shot Type - this controls the way the recorded shots are recalled by the system. Swoop, Cut and Fade.

As Router Control

This section details the protocol for controlling Kahuna Switcher as routers. It covers the protocol used to Change the Source Destination
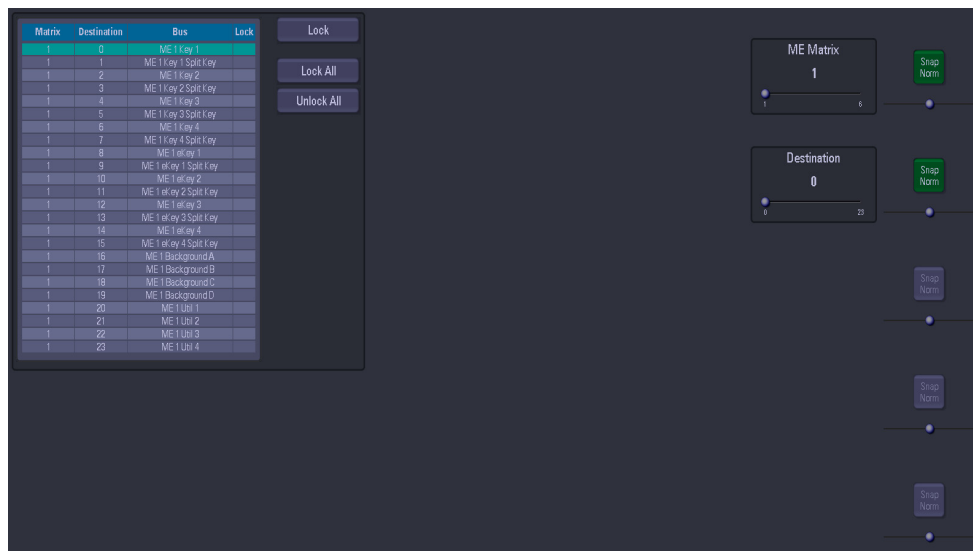
Matrix - Retrieve source names (Router Control systems can contain a multiple of Matrix configurations).

Destination - Physical outputs associated with currently selected router matrix.

Bus - selects the source on the currently selected ME Matrix

Lock - this button locks the currently selected bus

Lock All - will lock all the buses displayed in the table for the currently selected ME matrix only.

Editor Control

GVG100

This function allows external equipment software to control some functionality on Kahuna, such as the Crosspoint selection, DMEM's, Transition Control.
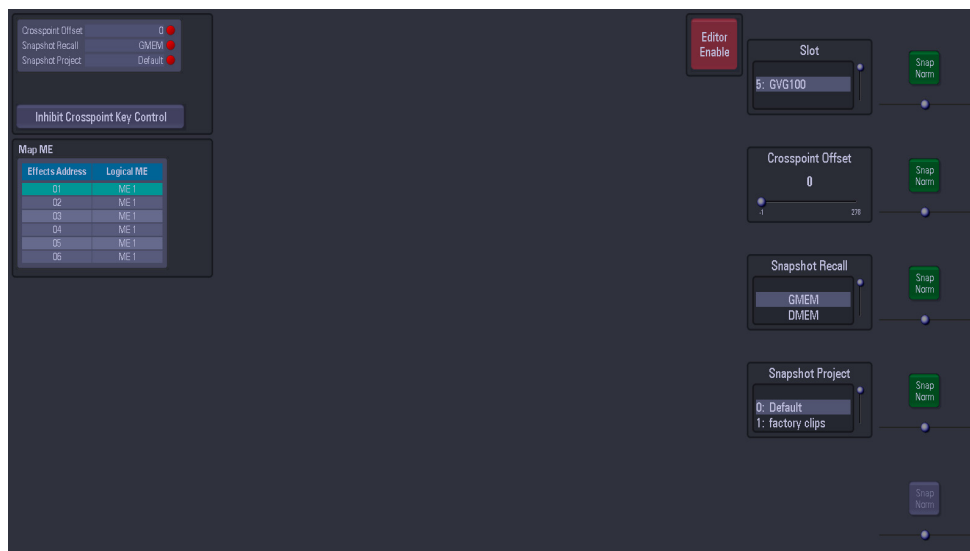
Before using this protocol the required DMEM that are going to be used with the external equipment software should have been saved into the "Default" file on the Kahuna mainframe. This will enable external equipment software to recall the required DMEM.

Note: This example the GVG 100 Control protocol will be used.

The **Snapshot Recal**l parameter should be set to "Auto" allowing the external equipment software to recall DMEM, but the user can also set the parameter to only allow DMEMs to be selected.

Crosspoint Selection

Note: GVG 100 Control protocol directly drives linked Mixer parameters for Bus Control and Transition Control.
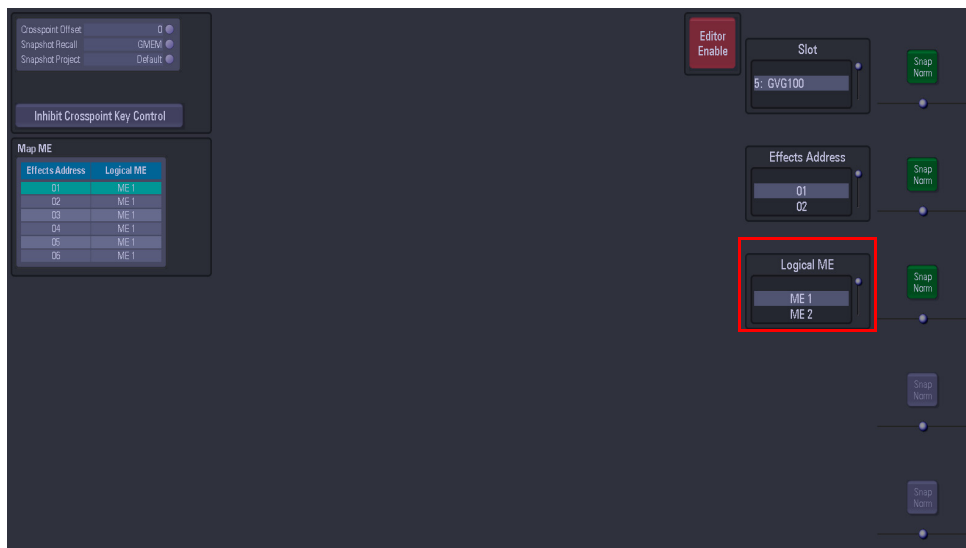
The Map ME parameter allows the user to offset the Mixer with the Editor, so for example the "PP" (Program/Preview) can be set to the Mixer.

Crosspoints can be selected to the following buses for each Mixer in the User Config - Crosspoint Mapping menu.

- BKGD A
- BKGD B
- KEY 1 FILL
- KEY 1 KEY
- KEY 2 FILL
- KEY 2 KEY

Crosspoint selection for Auxes

Crosspoints can be selected to be used with the Aux buses.

Transition Control

The following can be included in a transition:

- Transition mode - can include background, Key1, Key2, Key3 and Key4 in the transition
- Transition Types - includes MIX, WIPE and MATTE MIX
- Auto Transition Start
- Transition rate
- Transition Preview
- Transition Key On/Off

Key Control
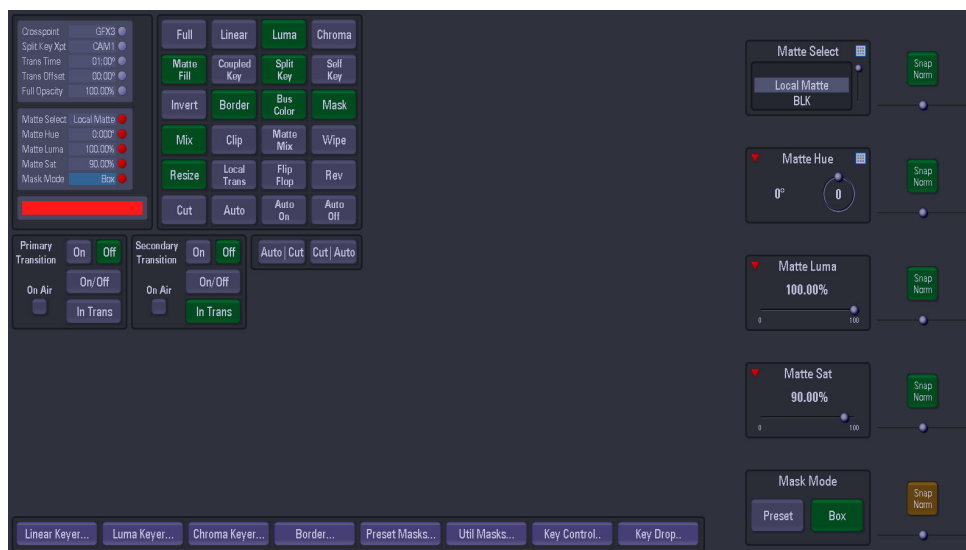
The following can be selected to affect Key1, Key2, Key3 and Key 4

Matte Fill On/Off
- Key Source Select - Auto (Coupled), Split and Self
- Mask Source Select
- Key Type - Full, Linear, Luma
- Key Edge Modify - Border
- Key Invert

Snapshot
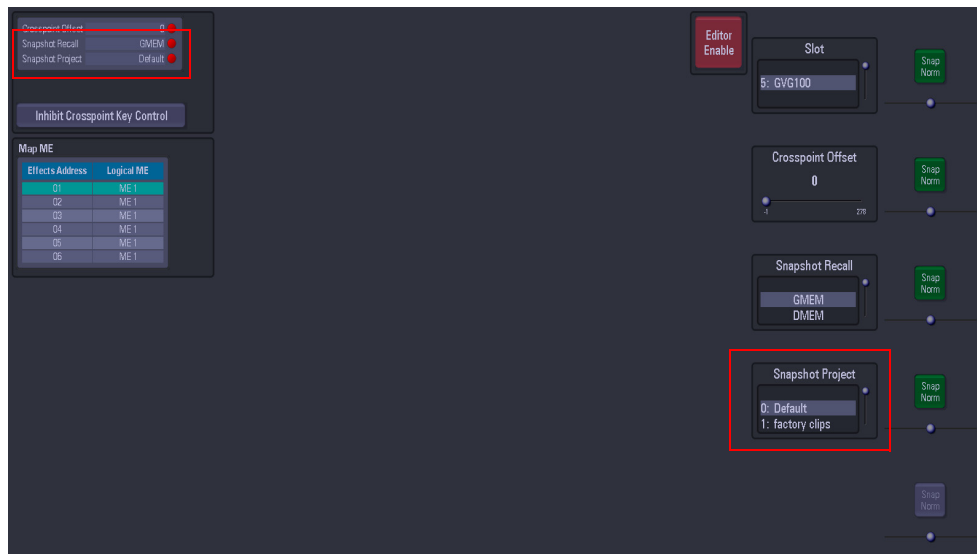
Snapshot Recall - Loads a Kahuna DMEM Snapshot.

EDL (Edit Decision List)

With the release of Kahuna software V8.4xx and greater, Kahuna is now able to create and export an "Edit Decision List".

What is an Edit Decision List

An edit decision list or EDL is an itemized list of video footage and associated time codes that work to either:

- Edit a long unedited or "raw" video file into a shorter finished video piece.
- Edit multiple videos together to create a finished video piece.

Purpose: The purpose of an edit decision list is when the person making the decisions for the content of a video needs to relate that information to the person who will be editing the video.

Using EDL on Kahuna

Kahuna records video cuts and "Auto" transitions on the program Bus, this then creates a file that is exported as a CMX3600 format file to a memory device, which in-turn allows the file to be imported into an editor such as the Grass Valley EDIUS.
The EDL menu is accesses through the "**Peripherals**" menu, touch the **{PERIPH}** button, then in the Peripherals menu, touch the **{EDL...}** button as shown below:
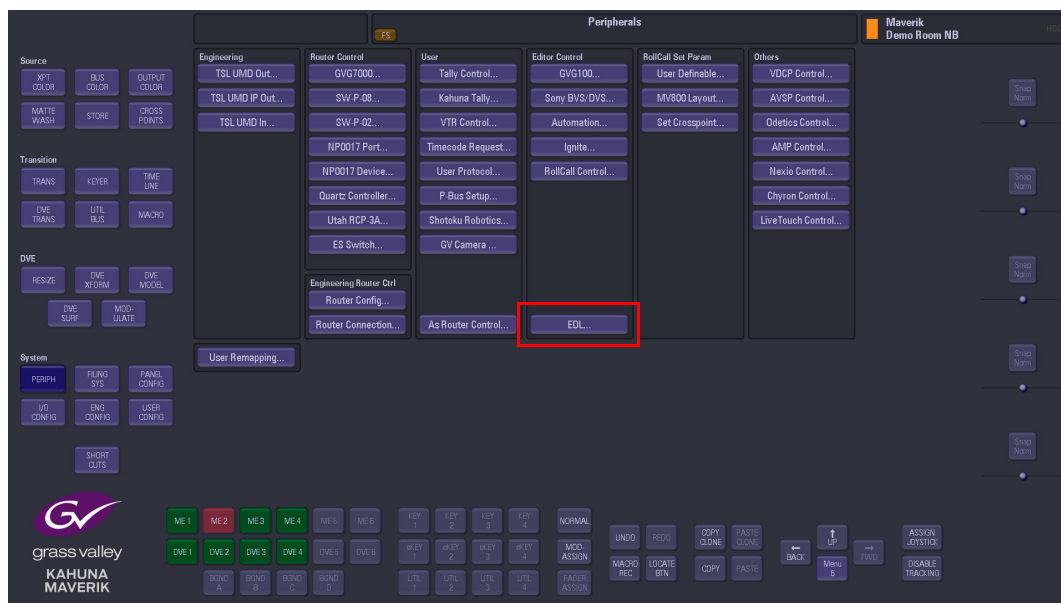
Once in the "**Peripherals - EDL**" menu, you can start setting up the menu to record.
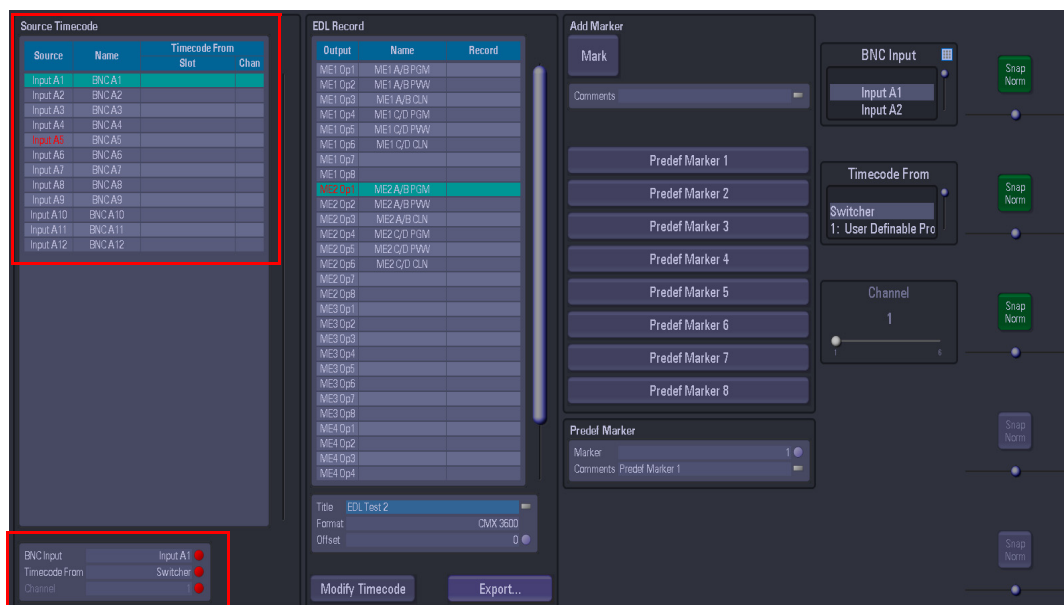
The "**Source Timecode**" column displays the all available inputs on the input cards and their associated crosspoints. Touch the attacher below the Source Timecode column to set where the Timecode comes and the channel (if necessary), from for each source. If the source is from a video server, its timecode should be from the controlling protocol such as VDCP. If the source is from a camera, its timecode should be from the studio clock or the switcher's internal timecode.
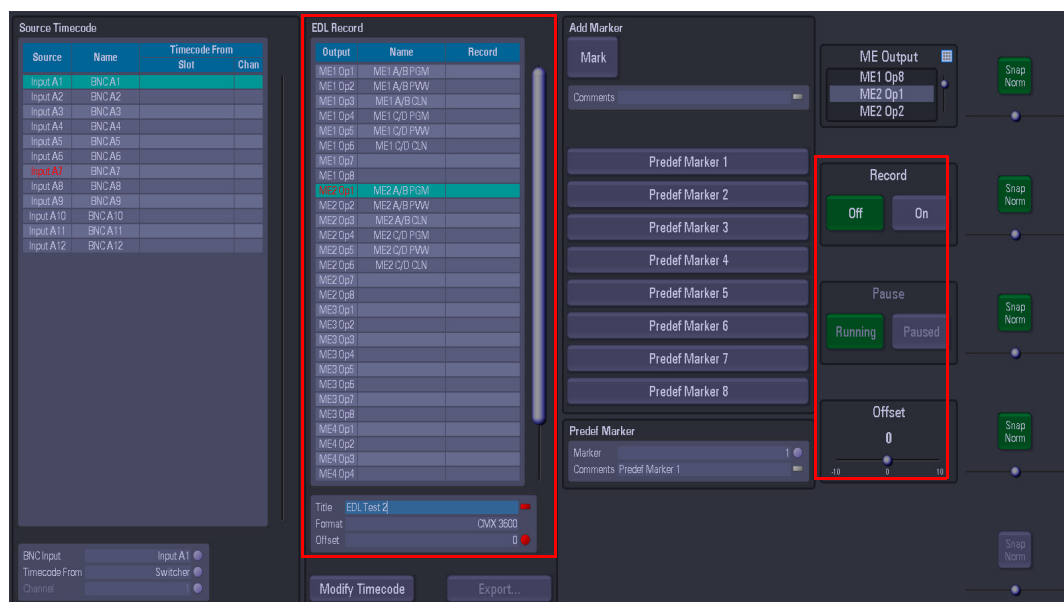
With all the source timecodes setup the user can start recording EDL on a M/E output. Use the M/E Output parameter to select the M/E output, (as shown above with the tallied output).

> Note: Only "**On Air**" output can be recorded.

In the attacher below the EDL Record table, you can give the EDL file a name, this is the title in the EDL file, NOT the file name, then to start the recording process by touching the "**Record**" **{On}** button. All program output background changes and any "**Auto**" transition; Wipes or Mixes are recorded.

To stop the record process, touch the "**Record**" **{Off}** button.
Recording can be Paused and Resumed. Once "**Record**" is turned off, an EDL file will be created. The name of the file is "**SWRx_MEyOPz.EDL**", where x, y and z are the switcher and M/E output numbers. The user can give the EDL a title.

Once the file is created successfully, the user can then Export the file to an USB. The file exported will be tagged with date and time and the file name will become SWRx_MEyOPz_ddmmyyyy_hhmmss.EDL (example: SWR1_ME2OP1_09012019_171820). You can use the timecode "**Offset**" parameter to compensate time delay. Touch the {Modify Timecode} button to regenerate the file with the new offset.
The exported file is in CMX 3600 format, which has a limit of 999 entries.

> IMPORTANT: If you record the same output again, it WILL overwrite the existing file. Therefore it is good practice to export the EDL once recording finished.

With the record process stopped, notice that the **{Export...}** button is now alive.
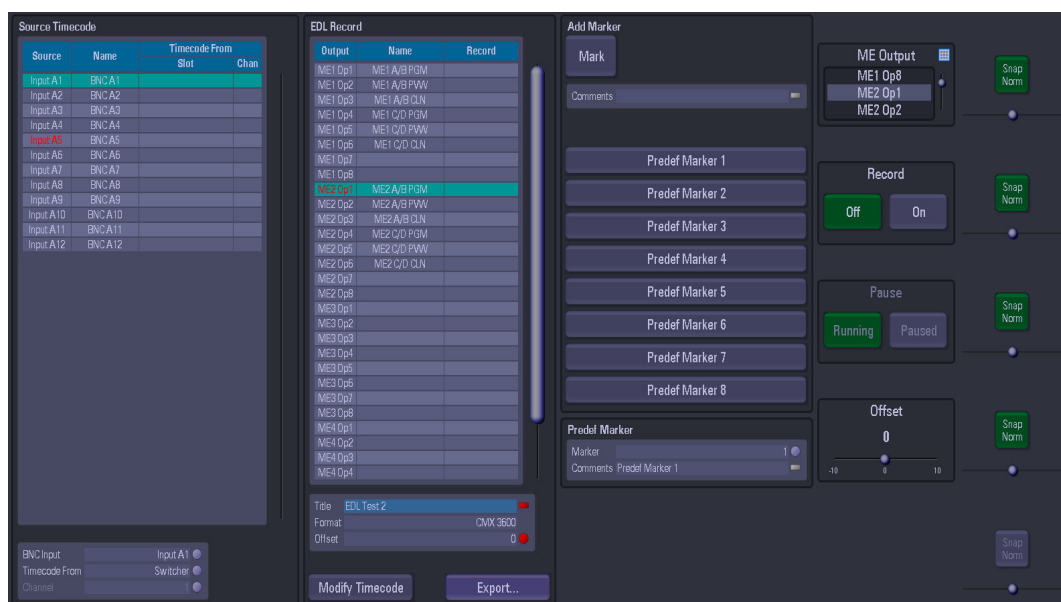
Touching the **{Export}** button will display the "**Filing System - Export**" menu where you can setup the export process.

In the Filing System - Export menu, touch the **{Select}** button to select the EDL folder. The small square next to the name will turn green.
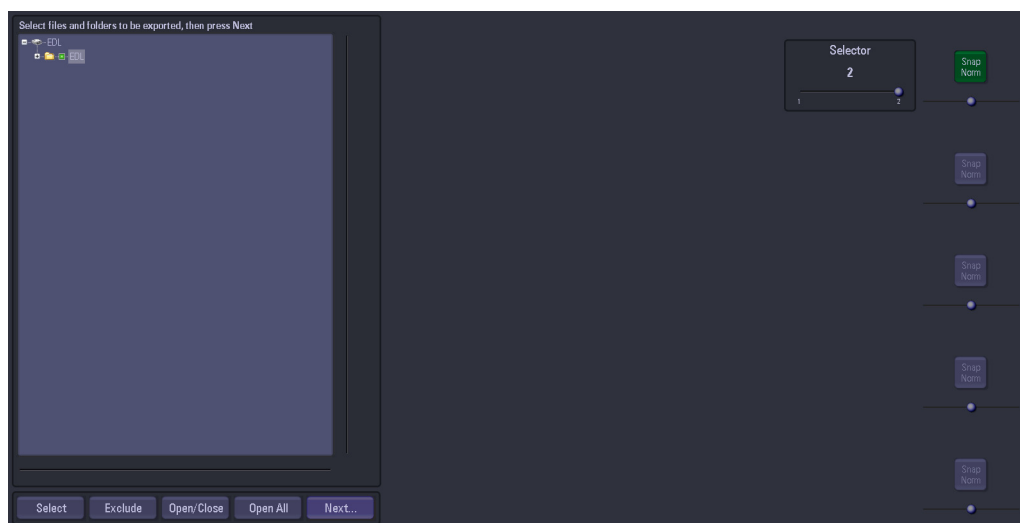
Next, use the "**Destination Device**" parameter to select the memory device that the EDL file will be exported to and then touch **{Select Device}**. You can now either create a "**New Folder**" to place the EDL file into or just export the file directly to the device. To start the export process, touch the **{Start...}** button.
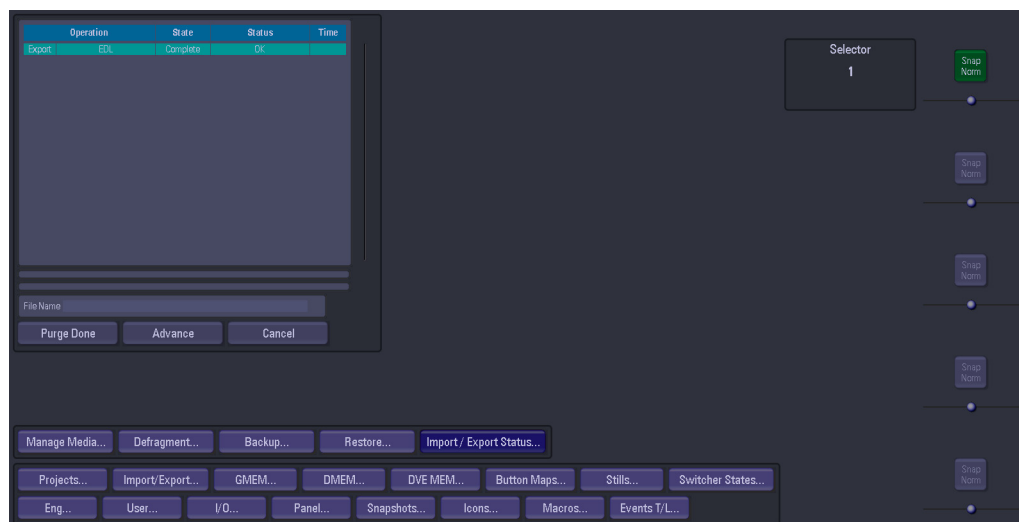
After touching the **{Start}** button, a new menu appears; the Filing System - Import/Export Status menu which displays the export status. The table displays the status of the exported file. The top one in the list is always the most recent export.

Exported EDL File

The exported file will be seen on the memory device as a folder then double click on the EDL folder to display the EDL file.

Name	Date modified	Type	Size
EDL	09/01/2019 17:18	File folder	

Name	Date modified	Type	Size
SWR1_ME2OP1_09012019_171820	09/01/2019 17:18	EDL File	2 KB

For this example the EDL file - SWR1_ME2OP1_09012019_171820 has been associated with Notepad so the file contents can be read.

SWR1_ME2OP1_09012019_171820 - Notepad

File Edit Format View Help

```
TITLE: EDL Test 3 BY KAHUNA 09/01/2019 17:18:10
FCM: NON-DROP FRAME
001 BNCA2     V C       17:17:50:14 17:17:52:06 01:00:00:00 01:00:01:17
002 BNCA3     V C       17:17:52:06 17:17:52:17 01:00:01:17 01:00:02:03
003 BNCA4     V C       17:17:52:17 17:17:53:03 01:00:02:03 01:00:02:14
004 BNCA5     V C       17:17:53:03 17:17:53:19 01:00:02:14 01:00:03:05
005 BNCA6     V C       17:17:53:19 17:17:56:01 01:00:03:05 01:00:05:12
006 BNCA6     V C       17:17:56:01 17:17:56:01 01:00:05:12 01:00:05:12
006 BNCA1     V D   012 17:17:56:01 17:17:59:14 01:00:05:12 01:00:09:00
007 BNCA2     V C       17:17:59:14 17:18:00:00 01:00:09:00 01:00:09:11
008 BNCA3     V C       17:18:00:00 17:18:00:11 01:00:09:11 01:00:09:22
009 BNCA4     V C       17:18:00:11 17:18:00:23 01:00:09:22 01:00:10:09
010 BNCA5     V C       17:18:00:23 17:18:02:12 01:00:10:09 01:00:11:23
011 BNCA5     V C       17:18:02:12 17:18:02:12 01:00:11:23 01:00:11:23
011 BNCA6     V D   012 17:18:02:12 17:18:04:06 01:00:11:23 01:00:13:17
012 BNCA1     V C       17:18:04:06 17:18:04:15 01:00:13:17 01:00:14:01
013 BNCA2     V C       17:18:04:15 17:18:04:24 01:00:14:01 01:00:14:10
014 BNCA3     V C       17:18:04:24 17:18:05:09 01:00:14:10 01:00:14:20
015 BNCA4     V C       17:18:05:09 17:18:06:15 01:00:14:20 01:00:16:01
016 BNCA4     V C       17:18:06:15 17:18:06:15 01:00:16:01 01:00:16:01
016 BNCA5     V D   012 17:18:06:15 17:18:10:01 01:00:16:01 01:00:19:12
```

Auto Trans Mix
D= dissolve
012 = Frames for transition time

SWR1_ME2OP1_09012019_165558 - Notepad

File Edit Format View Help

```
TITLE: EDL Test 2 BY KAHUNA 09/01/2019 16:55:45
FCM: NON-DROP FRAME
001 BNCA8     V C       16:55:31:00 16:55:32:17 01:00:00:00 01:00:01:16
002 BNCA1     V C       16:55:32:17 16:55:33:01 01:00:01:16 01:00:02:00
003 BNCA2     V C       16:55:33:01 16:55:33:11 01:00:02:00 01:00:02:11
004 BNCA3     V C       16:55:33:11 16:55:33:20 01:00:02:11 01:00:02:19
005 BNCA4     V C       16:55:33:20 16:55:35:24 01:00:02:19 01:00:04:23
006 BNCA8     V C       16:55:35:24 16:55:37:06 01:00:04:23 01:00:06:06
007 BNCA5     V C       16:55:37:06 16:55:37:16 01:00:06:06 01:00:06:16
008 BNCA6     V C       16:55:37:16 16:55:38:24 01:00:06:16 01:00:07:23
009 BNCA6     V C       16:55:38:24 16:55:38:24 01:00:07:23 01:00:07:23
009 BNCA4     V W011 012 16:55:38:24 16:55:40:14 01:00:07:23 01:00:09:13
010 BNCA8     V C       16:55:40:14 16:55:40:21 01:00:09:13 01:00:09:21
011 BNCA7     V C       16:55:40:21 16:55:42:01 01:00:09:21 01:00:11:00
012 BNCA6     V C       16:55:42:01 16:55:42:20 01:00:11:00 01:00:11:19
013 BNCA7     V C       16:55:42:20 16:55:45:08 01:00:11:19 01:00:14:08
```

Auto Trans Wipe
W = Wipe
011 = Wipe Shape
012 = Frames for transition time

Column:

1: event number from 1-999
2: source name
3: what's involved in the edit i.e. V-Video. As Kahuna is a video switcher, you will only see V in this column
4: the type of edit i.e. C-Cut, D-Dissolve, W011-Wipe where "011" is the wipe pattern
5: transition duration for Dissolve or Wipe
6: source in-time
7: source out-time
8: record in-time starts at 1 hour (the 1 hour start time seems to be from the VTR days)
9: record out-time

> Note: : In the EDL, a wipe or dissolve has a single event number, but has two lines of information. The first line represents information from the FROM source. The second line represents information from the TO source. Since there are always two sources involved in a wipe or dissolve, there must be two lines in the EDL. A Cut has one line of information.

Example of an Auto Trans Wipe12 frame dissolve:

```
009 BNCA6     V C         16:55:38:24 16:55:38:24 01:00:07:23 01:00:07:23
009 BNCA4     V W011 012 16:55:38:24 16:55:40:14 01:00:07:23 01:00:09:13
```

Only the "TO" source (BNCA6) has a defined out-time. The "FROM" source (BNCA4) will begin to fade out at the beginning of the edit (01:00:07:23) because it has no defined out-time. Notice on the first line of the entry, the FROM source has equal in and out-times.
A wipe is very similar to dissolve in EDL

RollCall Set Param

The RollCall Set Param menus are to send a set parameter message over the RollCall network. Kahuna is the RollCall Client. The parameter can be a value, a string or both. You can construct a general purpose message using the "User Definable" menu, or a specific message such as "MV800 Layout" or "Set Crosspoint" message.

User Definable

Set the Unit ID, you must specify the ID that you are trying to talk to. This is a unique ID which every unit has.

The RollCall Set Param menus are for sending a message to any unit on the RollCall network. The message can be a general purpose one, which consists of a command and a parameter. The parameter can be a value, a string or both.

MV-800 Layout

This parameter allows Kahuna using RollCall set parameters to communication with the MV-800 integrated multiviewer fitted in the Grass Valley Sirius 800 range of Routers.

Set the unique **Unit ID** to communicate with the multiviewer.

Wall - this selects video wall outputs 1 to 12

Layouts - this accesses the user defined video wall layouts (up to 64 individual layouts) saved.

Set Crosspoint

Set Crosspoint message is for switching a router source on a destination.

Set the unique ID for the unit that you are trying to communicate with.

Destination - the destination on the router

Source - the source that you are trying to switch on the router

Peripherals - Others

VDCP Control

VDCP is a common protocol for video servers. Note that only some commands (which means also functions) are mandatory; many are optional. If optional commands are not implemented in the disk server, VDCP Simple should be selected instead.

A video server is a system that has hard disk storage for video, and one or more audio/video channel connected to it. A channel on a server can play or record or both. The number of channels on the server, and what capabilities they have, are server dependent.

Playout

Press the **{VDCP Control...}** menu link button, this option is used to control video disk servers.

Enter the Playout.
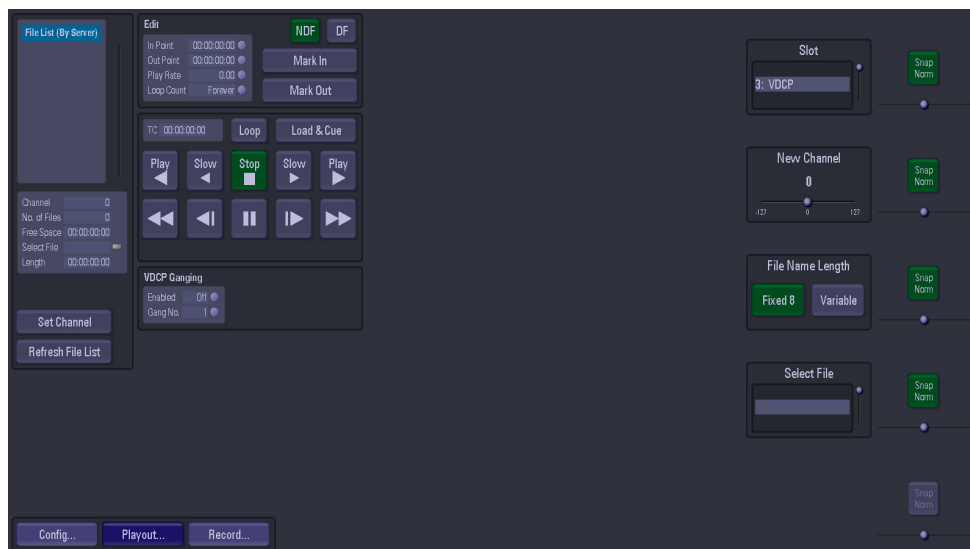
Parameter Controls

Slot - selects the slot that was setup in the Protocols menu

New Channel - selects a channel on the server

Select File - selects a clip by name

Edit

In Point - displays the play out start position of the selected clip

Out Point - displays play out end position of the selected clip

Play Rate - will allow the user to speed up or slow down a clip and change the direction of play

{Mark In Point} - used to set a play out start point within a clip

{Mark Out Point} - used to set a play out end point within a clip

{NDF} - Non-Drop-Frame format

{DF} - Drop-Frame format

The difference between the two is that with Drop-Frame format the frame address is periodically adjusted (once every minute) so that it exactly matches real time (at the 10 minute mark), while with Non-Drop-Frame format the frame address is never adjusted and gets

progressively further away from real time.

File List Attacher Controls

Channel - displays the selected channel on the server.

No of Files - displays the number of files in the File List

Free Space - displays the Free Space left on the Video Servers Hard Disk

Select File - allows the user select a file and to also rename a file

Length - displays the duration of the selected clip

File Name Length - allows the user to input file names greater than 8 characters by selecting Variable

{Set Channel} - action button once the Channel has been selected. Note that if the channel selected is not available on the server, or the access has been denied (normally because some other device is currently using this channel), the Channel will be set to 0 after the button is pressed.

{Refresh File List} - refreshes the file list after clips have been deleted or added.

Using this menu

Select a clip and touch **{Play}** to start back-to-back play out. The attacher

shows which clip is playing or about to play and its current timecode. While a clip is playing, Play Rate parameter can be used to change the play speed and direction.
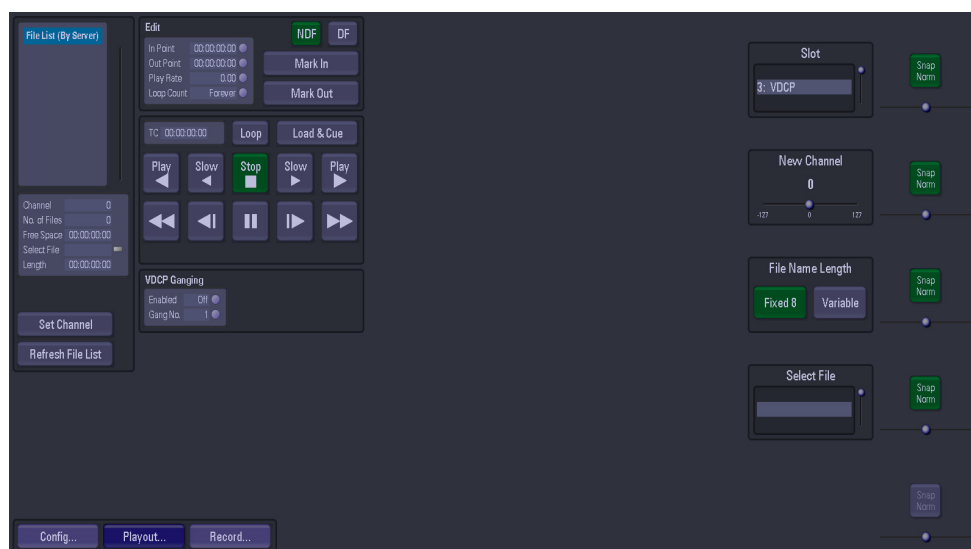
Using the Port parameter select the port the Video Disk system is connected to. This will then be displayed in the Configure Channel attacher, then select the channel number on the server and press the **{Set Channel}** button. Any stored clips will then be displayed in the File List. Using the Select File parameter, select the required clip. The total length of the clip will be displayed below the File List table, here the clip can also be re-named or deleted. The user can choose to play a whole clip or just a part of it by setting a play out start or/and play out end

position(s).

The Current Clip box will display the name of the current clip being played or about to be played.

VDCP Ganged Commands

Ganged Commands - this allows for VDCP devices to be gang rolled or cued. Press the {Gang Commands} button, notice that a new option has appeared in the menu next to the Transport Control buttons, this option displays the available Gang VDCP Ports. There are 4 Gang Ports available.
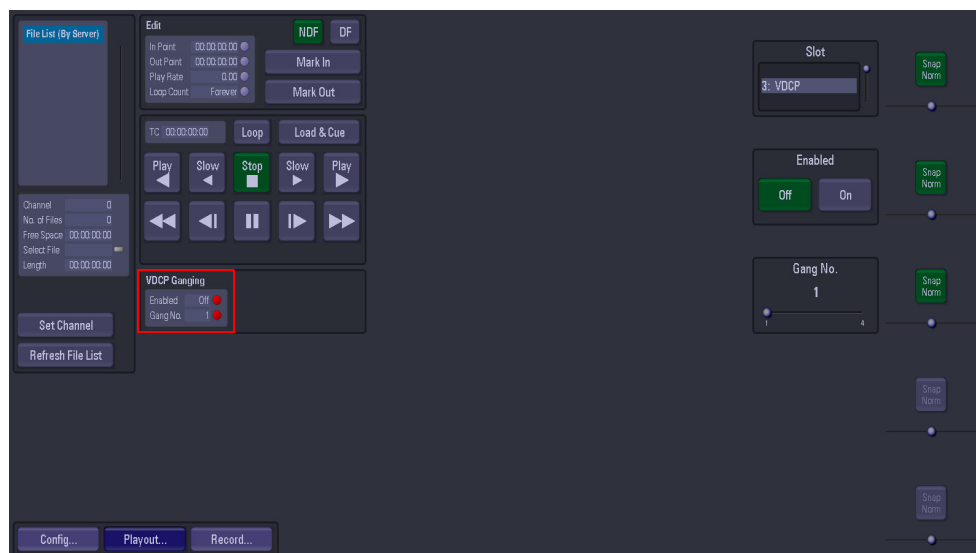
Transport Control

Play - will play a clip backwards and play forwards at standard speed

Slow - will play a clip backwards and forwards at slow motion speed

Stop - stops a clip

Fast Reverse and Fast Forward - like fast rewind and fast forward

Pause - pauses the current clip

Step Forward Step Backward - Steps a clip forward and backward by one frame

Record

This menu will allow video/audio material to be recorded to the video disk system. The user needs to give the new clip a name and record duration and then press the Record action button.

The new name can not duplicate any existing ones and all names are case sensitive.

Record Attacher

Capacity - displays the server hard disk capacity

Name - put in the name of the clip that is going to be recorded

Slow

Slow

Play
Forward

Play
Reverse

Fast
Reverse

Fast
Forward

Step
Backward

Step
Forward

Pause
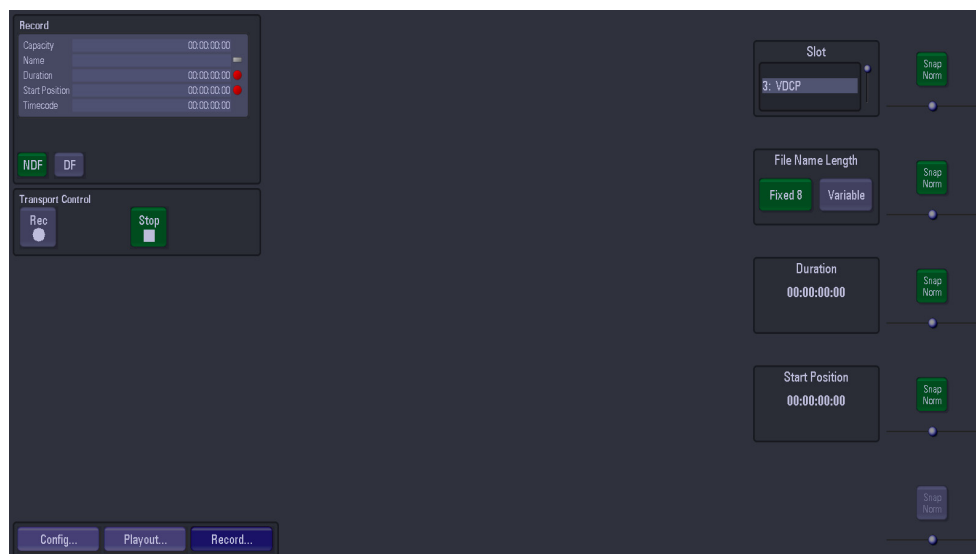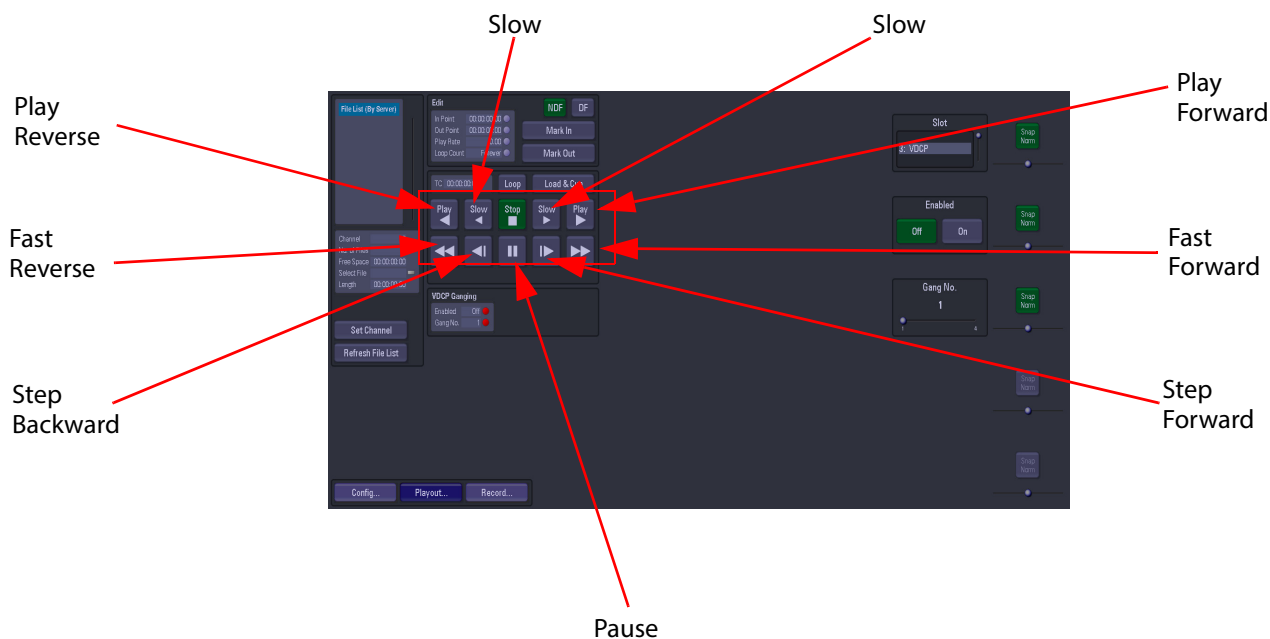
Variable in the File Name Length parameter allows names longer that 8 characters)

Duration - displays the record duration.

Start Position - sets the start position timecode, for the start of the record process

Timecode - displays time code as the clip is being recorded

Transport Control

Record - starts recording

Stop - stops the recording process

AVSP Control

Advanced Video Server Protocol, It allows the running, recording and editing of clips from up to 6 channels with either EVS XT or EVS XT2.

The protocol is connected via a Serial Port, one serial port will support the use of 6 channels of EVS, either in Playback or Record modes.

Play

The box in the top middle will display the number of configured EVS channels and their relevant details, these channels are displayed as "Rec" or "Play".
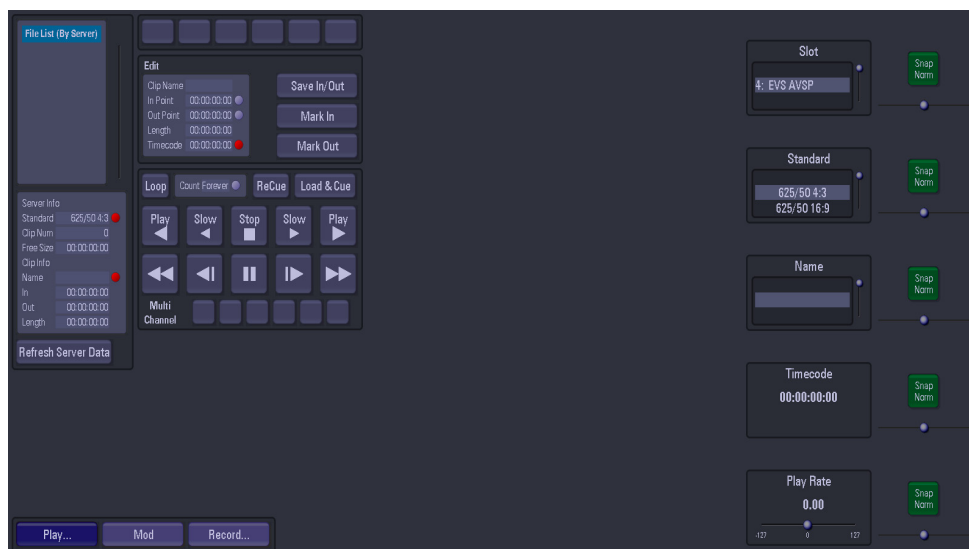
Center Top Buttons - (Channel Selector Area) - which channel of EVS is being controlled.

Slot - this displays the serial port that is connected to the server.

Standard - this has to be set to the video standard being used by the server.

Name - the Clip Name

Server Info

Data regarding the server being used which includes:

Standard - the Video Standard of and number of Clips stored on the server

Clip Num - the number of the clip being played

Free Size - the remaining Free Storage Space,

Clip Info - data regarding the name of the chosen clip, total clip duration and In/Out points.

Transport Control - generic play controls affecting the selected clip includes PLAY Fwd, PLAY Rev, Play ½ speed fwd, rev, Pause.

> Note: It is advisable to {Pause} when the clip is needed again because Stop will stop the clip from running, and has essentially emptied the contents of that channel, it is then necessary to Load and Cue the next clip. This will set the new clip to the marked In point.
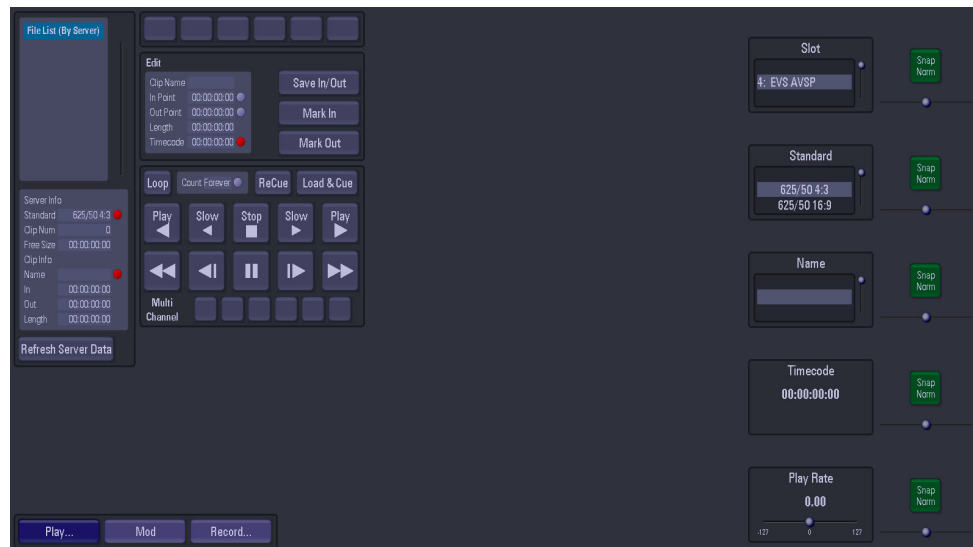
Edit In / Out Points - the currently stored In and Out points for the currently loaded clip. Using the attachers and Snap/Normal buttons it is possible to scroll through the clip to re-assign a new In or Out point.

> Note: Pressing and holding the Snap Normal button on the GUI brings up the internal popup number pad, for the inserting of Time Code

Length - total duration of the currently loaded clip

Timecode - current Timecode of loaded clip

Play Rate - controls the playback speed of the clip

Save In/Out - saving the In and Out points will save to the server. Editing a clip and re-saving will overwrite the original In/Out points. The action will be validated then Save - this ensures that a clip will always start on field 0 when using Interlaced standards, it is a requirement of the EVS that a clip begin on field 0 and end on field 1.

MOD
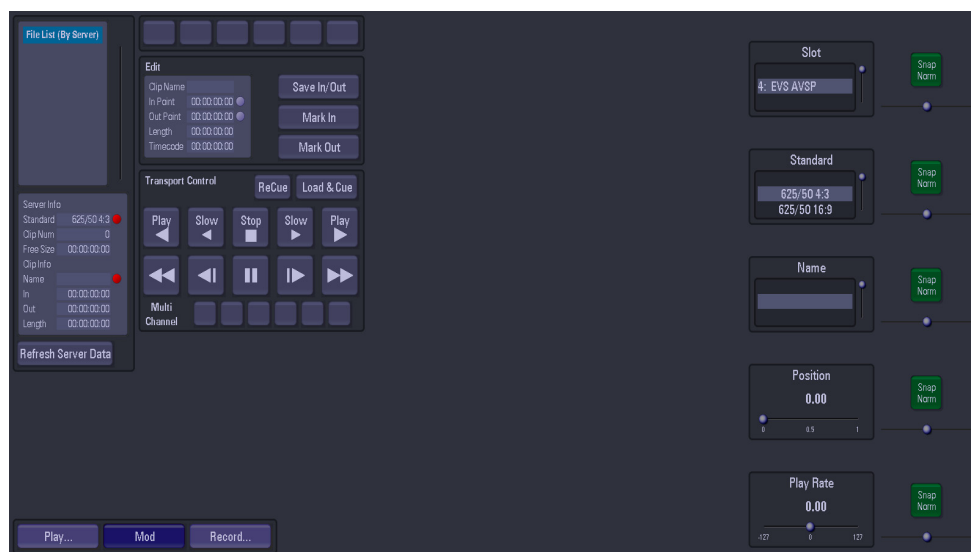
The Play Rate parameter in this menu means that it is possible to Modulate the play rate. Modulators can be attached to this parameters in the usual fashion.

RECORD

Recording will create a stream of footage within the selected server, additional recordings are appended onto the end of the stream.
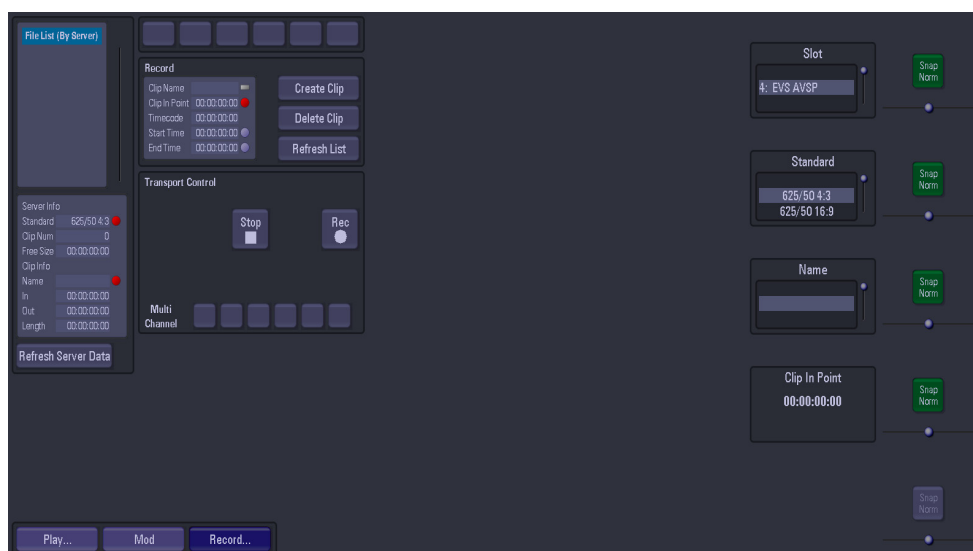
Ensure the "Rec" channel(s) is selecting a video source that is running in the same video standard as the server, it may be useful to route this source and the record channel to a monitor, to be certain that pictures are actually being recorded. The EVS can be set to record

from ME Opt's or directly from external sources.

Start Recording

Select the correct "Rec" channel from the top section, then give the Clip a name (it is advisable to give the recorded clip a name as the EVS generates a random number that is not easily remembered), press the **{Rec}** button, record until satisfied, then Stop

Finally press **{Create Clip}** and the Clip will be saved to the server and appear in the Clip List

Now it is possible to go back to the Play menu and Edit the In and Out points of the newly recorded clip.

Delete Clip - will delete the recorded clip

Odetics Control

Odetics protocol is a serial based protocol, that will allow Kahuna to control external equipment such as disk servers.

Using Odetics Control
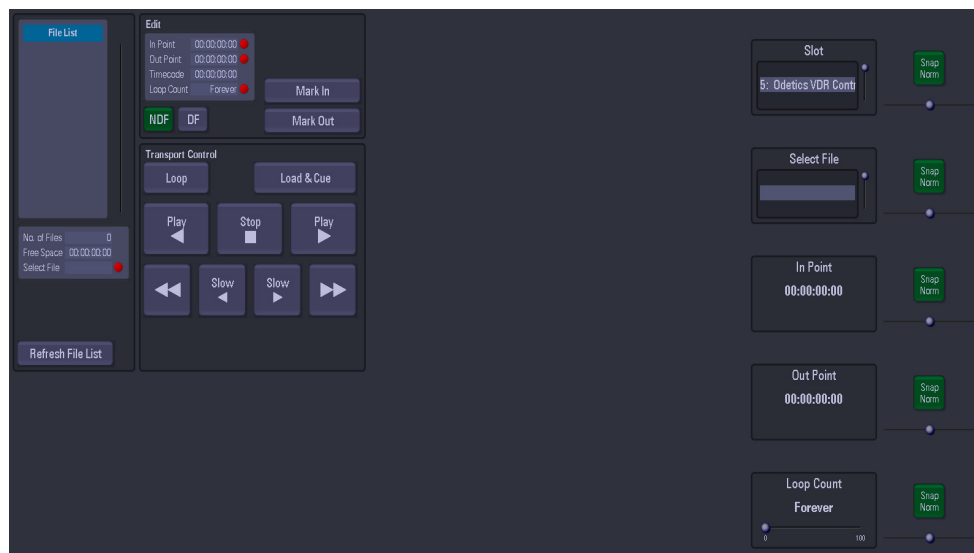
Controls and Parameters

Slot - selects the serial port that is connected to the external equipment

Select File - selects a file by name

Loop Count - when a file is set to play, if the **{Loop}** button is touched, the **Loop Count** parameter can be set to play the file; Forever or from 1 time up to 100 times then stop.

Mark In / Out Points - the currently stored In and Out points for the currently loaded clip. Using the attachers and Snap/Normal buttons it is possible to scroll through the clip to re-assign a new In or Out point.

{NDF} - Non-Drop-Frame format

{DF} - Drop-Frame format

The difference between the two is that with Drop-Frame format the frame address is periodically adjusted (once every minute) so that it exactly matches real time (at the 10 minute mark), while with Non-Drop-Frame format the frame address is never adjusted and gets

progressively further away from real time

File List - this table displays all available files external tape or equipment

No of Files - total number of files in the File List

Free Space - displays the free space left on the external equipment disk

Select File - allows the user to select a file from the File List

Refresh File List - refreshes the file list after file had been deleted or added.

AMP Control

AMP protocol is an IP Based control structure, it will support 4 channels (VTR1, VTR2, VTR3, & VTR4) in a single device, and also supports multiple devices over different IP Addresses.

> Note: Name the device as required e.g. Server1, this name will appear wherever the user needs to select it.

> Note: If the server is not on a local network, an IP Gateway will be required.

Using AMP Control

Kahuna can manage Folder (Bin) selection; set In and Out points, as well as the Standard VTR type commands. It is recommended that Macros and/or Clones are used to assign these controls to the main control surface.
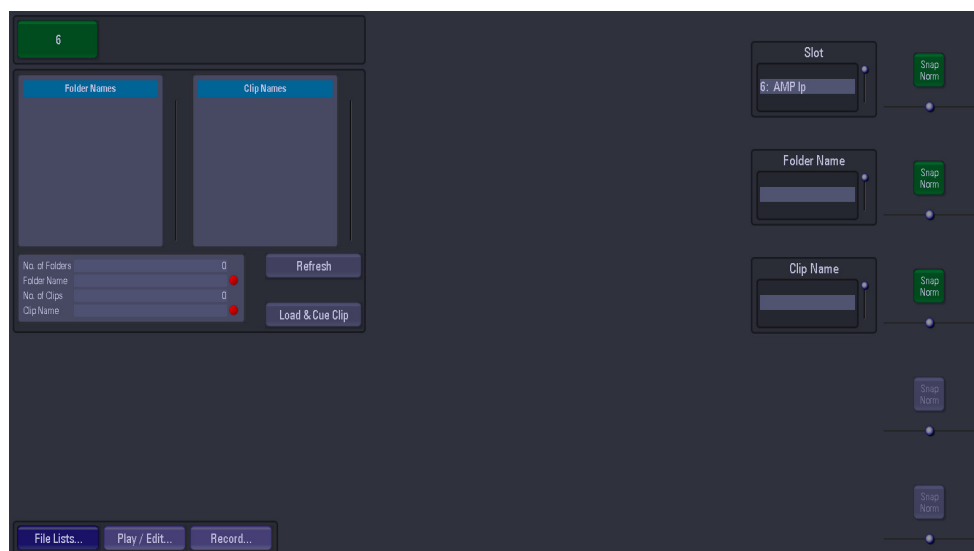
The **Peripherals - AMP File List** menu allows the user to set the VTR that is being controlled (green button at the top of the menu) and setup the working Folder Name and Clip Name lists.

> Note: Each VTR can be set to contain different Folders/Clips.

The **Clip Name** table displays all the clips in the current working folder on the server. **{Refresh}** button will refresh the Folder and Clip tables (e.g. if another controller adds a new Folder/Clip).

> Note: Kahuna uses the Folder Name and Clip Name for reference.

{Load & Cue Clip} button will load and cue the currently selected clip to the currently selected VTR.

AMP Play/Edit Clip

The **Play/Edit Clip** menu allows the user to set In/Out points for the currently selected VTR and clip, setting the In/Out points can be done either by using the VTR command buttons to position the clip then press the **{Mark In}** or **{Mark Out}** buttons, or by direct input using the In and Out parameter controls.
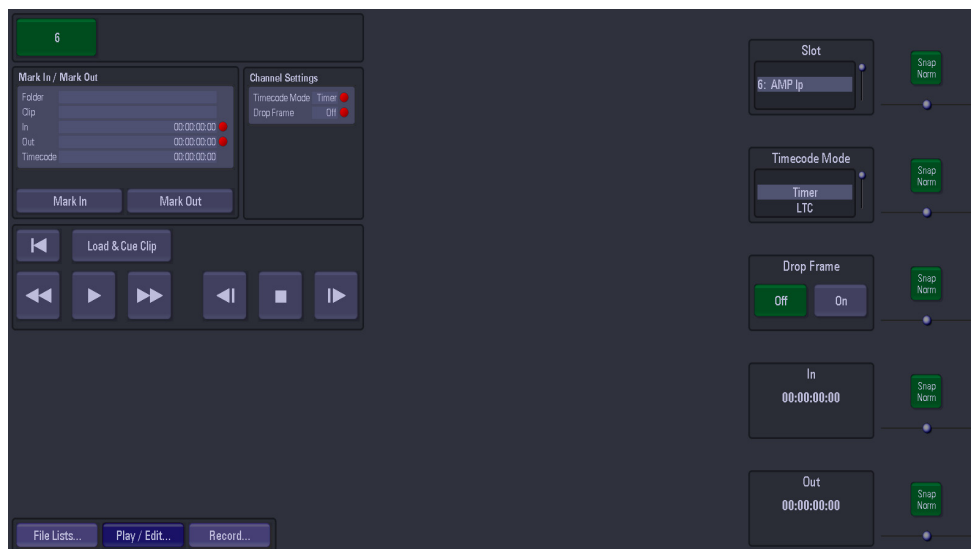
To assert the In/Out points, press the **{Load & Cue Clip button}**. To make a Macro that will Cue a clip and assert In and Out points, set the Clip as described above, once happy with the Clip, including its **In/Out** points, press **[MACRO REC]** button on the GUI.

Next, press **{Load & Cue Clip}** button, then press **[MACRO REC]** to stop recording the macro. The macro will now Load and Cue the selected Clip in the Macro main menu. View the macro and notice that it has stored the **Clip Name** and **In/Out Points**.

AMP Record

Kahuna can also be used to set-up the Record VTR (Channel).
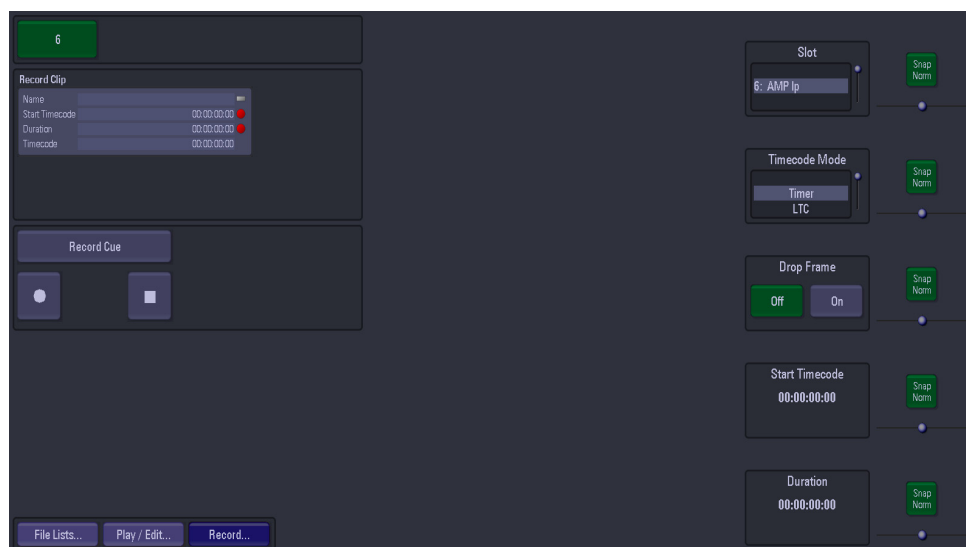
The record VTR/channel is set on the K2 server. To set the **Clip Name**, and **Timecode** press the

{Record Cue} button.

Nexio Server - AMP Protocol

Nexio Server is an Ingest and playback server supporting SD, HD and 1080p formats. Kahuna is able to communicate with Nexio via the AMP protocol over RS422 or IP Client transport types.

Nexio Play Menu

The **Nexio Play** menu allows the user to select files in the playout File List, set In/Out points for the currently selected file, setting the In/Out points can be done either by using the VTR command buttons to position the clip then press the **{Mark In}** or **{Mark Out}** buttons, or by direct input using the In and Out parameter controls.

Once the protocol is activated, Kahuna will automatically download the file list from the Nexio server. Touching the title bar of the **File List** will sort the files by Server, by Name, or by Date. (By Server means it is in the order that the Nexio server sends to Kahuna).

Control Channel is the channel for the transport commands to the Nexio server (play, stop, pause etc.). The control channel will initially set to the highest channel number for the server (i.e if it is a 4 channel server, it will set to 4 at start). If the user needs to change the control channel, change it before pressing **{Load & Cue}**.

The **Sync Channel** is the channel that follows the control channel i.e. if Sync Channel 1 is the Fill channel and Sync Channel 2 is Key channel, the user can set Control Channel for the transport commands to 1 and Sync Channel to 1&2, so the Key channel will always follow the Fill. channel.

If there is no need to edit the In/Out points, Kahuna will use the first/last frame of the clip as the In/Out points; if the user needs to trim the clip, set the In/Out points then press **{Load & Cue}**.

Note: It is recommended to setup the loop play parameters before doing a {Load & Cue}.

Select a file in the File List, press the **{Load & Cue}** button and the file will show in the "**Loaded File"** window. User the **In Point** and **Out Point** parameters to set the **Mark In/Out** points as required.
Select the transport command Control Channel, and then select the Sync and then press the Play button.

Touch the "Playout" attacher at the bottom of the menu, here the Play Rate parameter can be adjusted and the file set to "Loop" a set amount of times or forever if required.

The **Playout Yes/No** indicates what the control channel is capable of doing, i.e. if you have selected a control channel that is a Record Only channel, it will have Playout No in the window, then none of the playout transports will work
To jump to a particular frame in a file, set the **Timecode** to the frame and press **{Play}**.

Nexio Record Menu
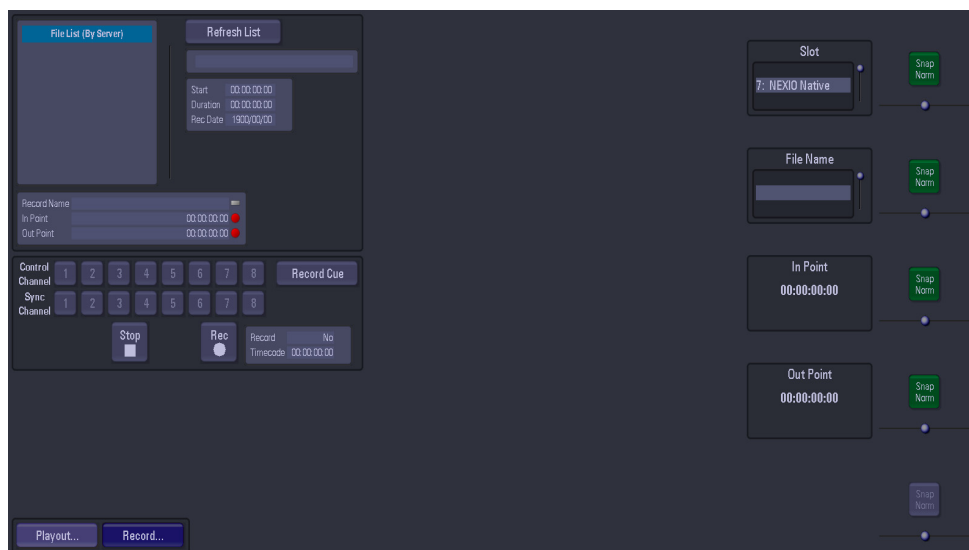
Select the correct **Control** and **Sync Channels**, then give the file a name for playout identification. Set the record **In Point** and **Out Point** and then press the **{Record Cue}** button.

Once happy with the settings press the **{Rec}** button and recording will commence.

Chyron Control

Overview

Kahuna is able to connect to Chyron graphics servers to load and play files. The Chyron system is also able to trigger a macro to run. Chyron has a dedicated protocol and control menu on Kahuna.

Setup - Example of Kahuna connecting to a Chyron System
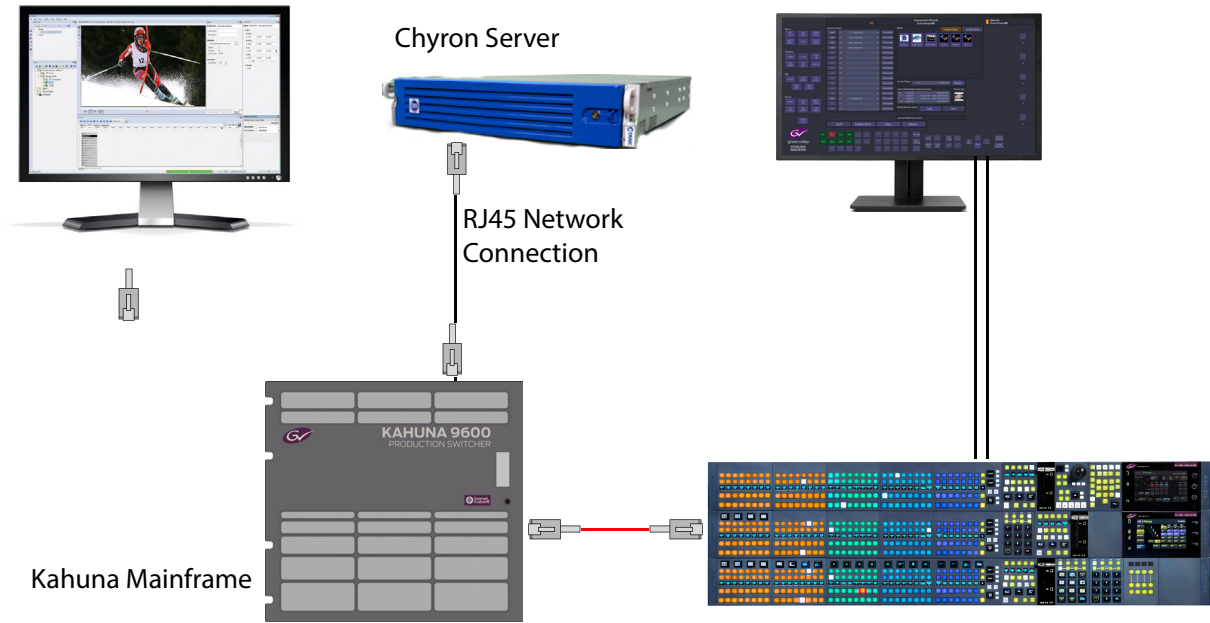
The Chyron server is connected to the Kahuna mainframe.

Kahuna Setup

In the "Eng Config" menu, touch the **{Protocols...}** menu link button.
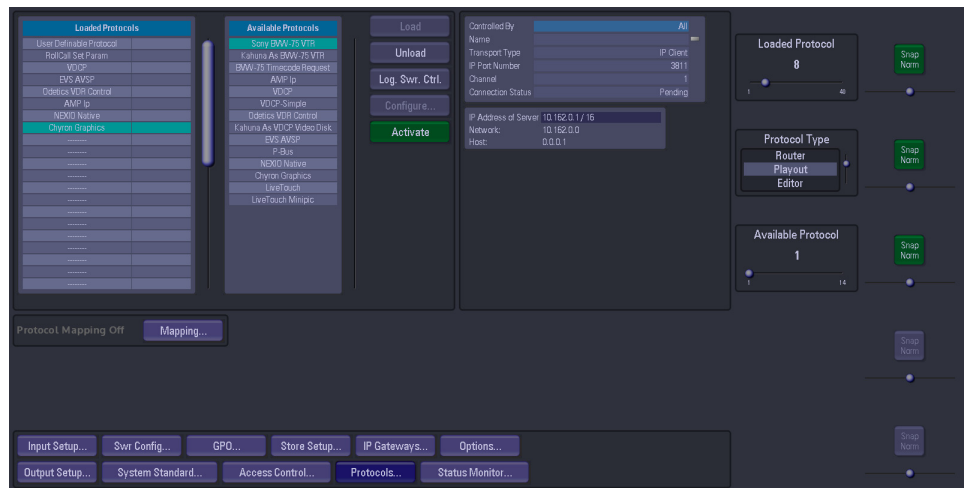
Select "Playout" in the "Protocol Type" parameter, then in the "Available Protocols" table, touch to select "Chyron Graphics" and then touch the {Load} button.

Touch the **{Configure...}** button to display the "Protocol Config" menu.
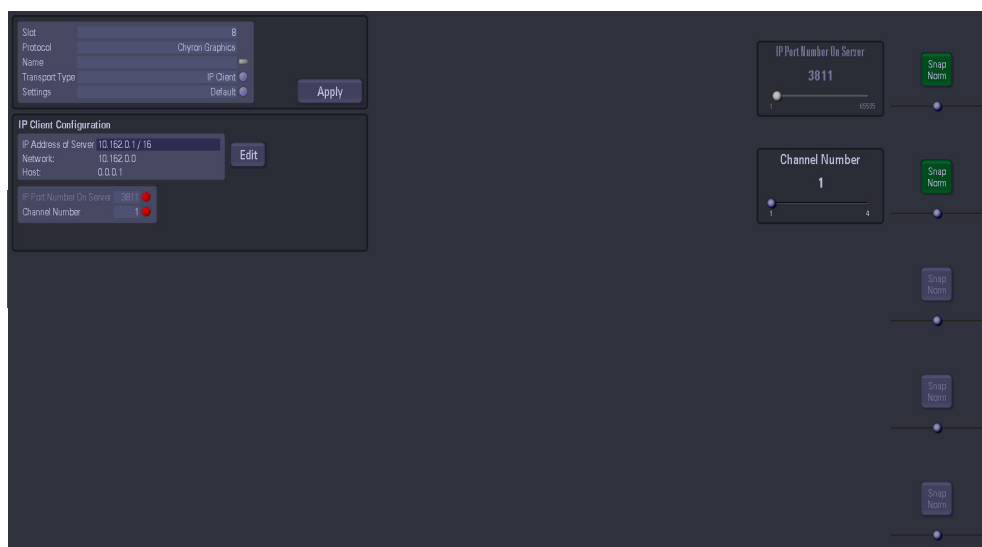
The "IP Client" transport type is default as "IP Client" and cannot be changed. Change the "Settings" parameter to "User" so that the "IP Client Configuration" parameters can be set, so that Kahuna can communicate with the Chyron server. Enter the IP address of the server, and set the "IP Port Number on Server", then touch the **{Apply}** button. In the Protocols menu, touch the **{Activate}** button and the protocol is setup.

Macro Control

To allow Chyron to trigger a macro on Kahuna, the "Macro Control" protocol has to be setup on Kahuna.
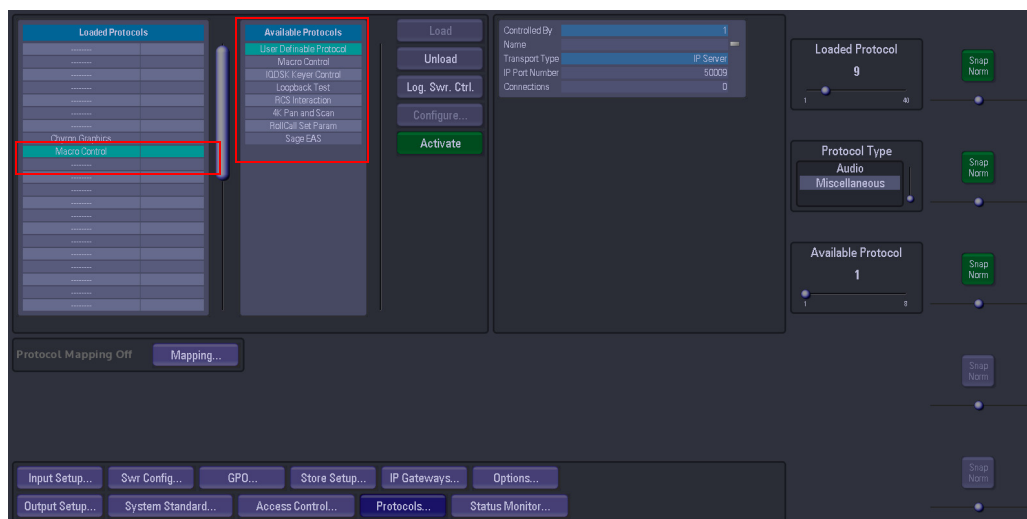
In the "Protocol Type" parameter, select "Miscellaneous", and in the "Available Protocols" table select "Macro Control" and touch the **{load}** button.
Touch the **{Configure...}** menu link button and in the Configure menu, select "IP Server" and select the correct port number and touch the **{Apply}** button.
In the "Protocols" menu, touch the **{Activate}** button to activate the protocol.

Peripherals - Chyron Control

Touch the **{Peripherals}** menu button and then in the "Others" column, touch the **{Chyron**

Control...} menu link button.
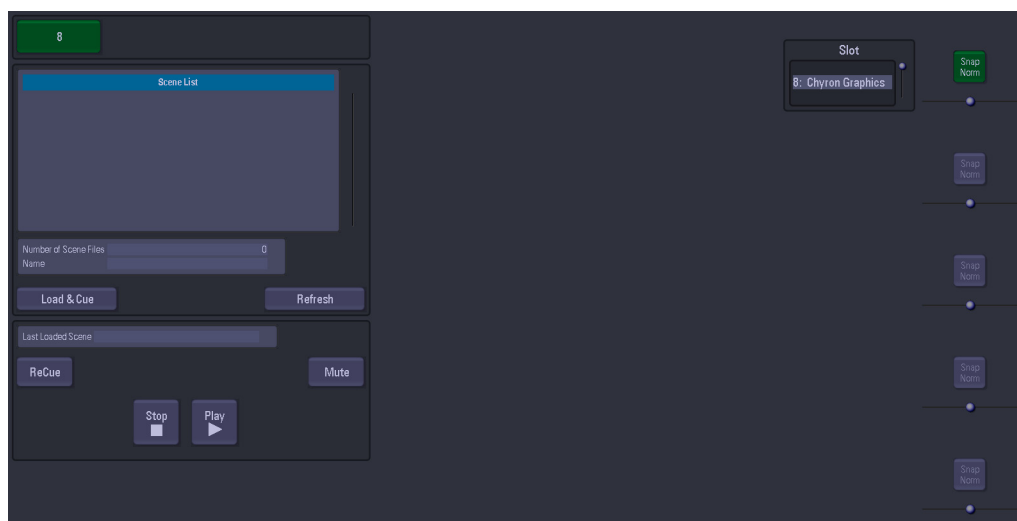
Once connected to the Chyron server, the "Scene List" will display the available clips/files that can be loaded and cued ready to play. Once the clip/file has played you can either select a different clip to load and cue ready to play or re-cue the last clip played. If there is embedded audio with the clip, the audio can be muted.

Chyron Triggering a Macro on Kahuna

The Chyron User Interface can be set to trigger a Macro on Kahuna.
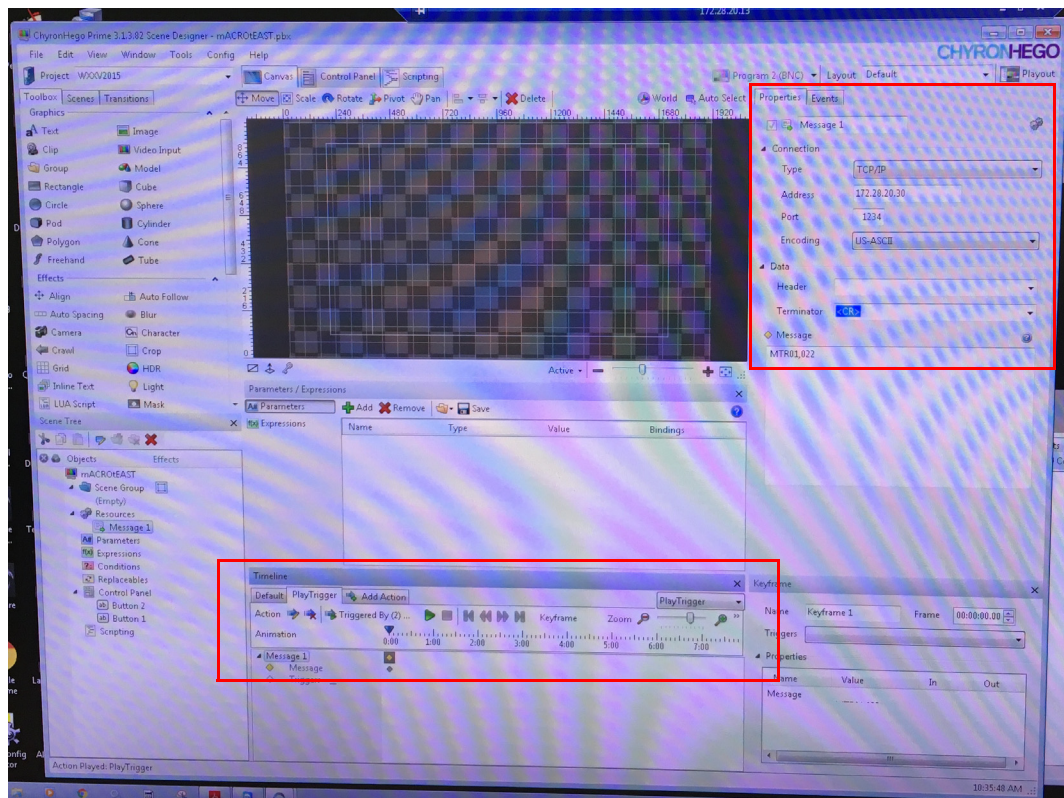
In the "Connection" area of the menu (above top right), enter the IP address of the Kahuna mainframe and the same "Port Number" as was set when setting up the Kahuna protocol menu. Then set the "Encoding" parameter to ASCII.
In the "Message" window, type "MTR01, (number of macro) i.e. 022. This will trigger macro 22 in the Kahuna mainframe.

> Note: Chyron will only Flash 1 or trigger the macro once on Kahuna and then cut the connection.

LiveTouch Control

Kahuna is able to connect to a LiveTouch server and load, cue and play files.

Setup - Example of Kahuna connecting to a LiveTouch System
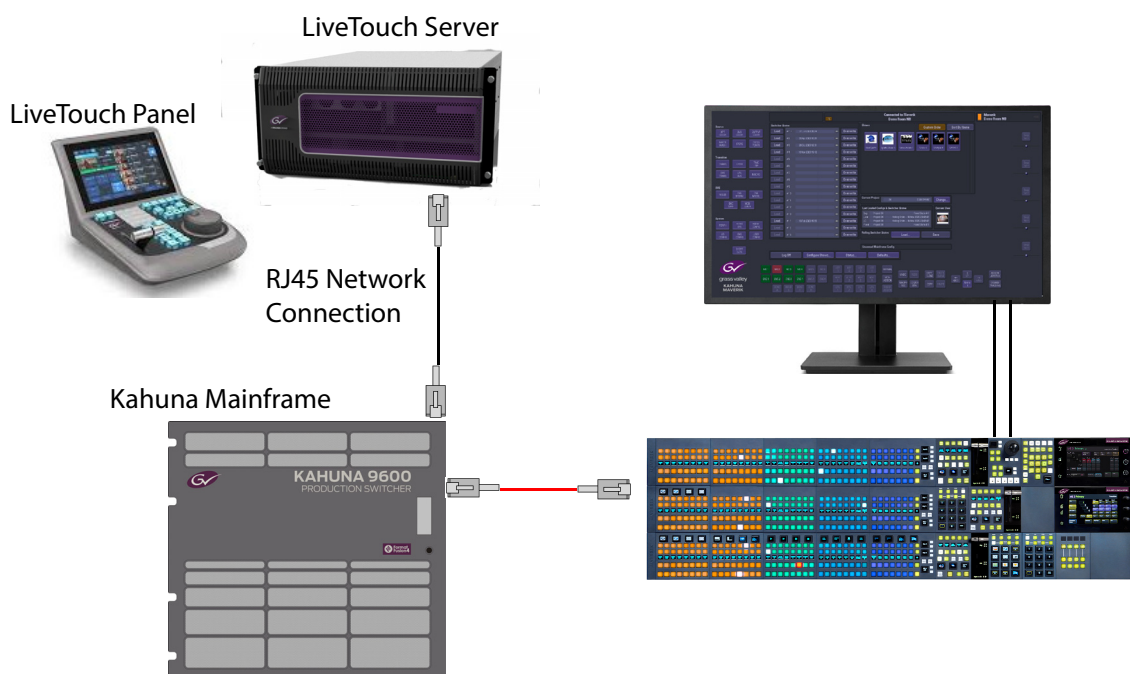
Protocol Setup

In the "Eng Config" menu touch the **{Protocols...}** menu link button. Scroll through the "Protocol Type" list until you get to "Playout".

Touch "LiveTouch" in the "Available Protocols" list and then touch the **{Load}** button, to add it to the "Loaded Protocols" list.
Touch the **{Configure...}** button to display the "Protocol Config" menu. Touch the **{Edit...}** button and enter the IP address of the LiveTouch server and make sure that the "IP Port Number on Server" is set to 80, then touch the **{Apply}** button.
The menu will return to the "Protocols" menu, finally touch the **{Activate}** button.
The "Connection Status" will show "Connected (Dual)"

Depending on hardware configurations, some LiveTouch systems can provide a thumbnail image for the "Playlist" entries.
To do this, you will have to assign an optional "LiveTouch Minipic" protocol, following the protocol setup process on the previous page.

Peripherals - LiveTouch Control

Touch the **{Peripherals}** button, then in the Peripherals menu touch the **{LiveTouch Control...}** menu link button.
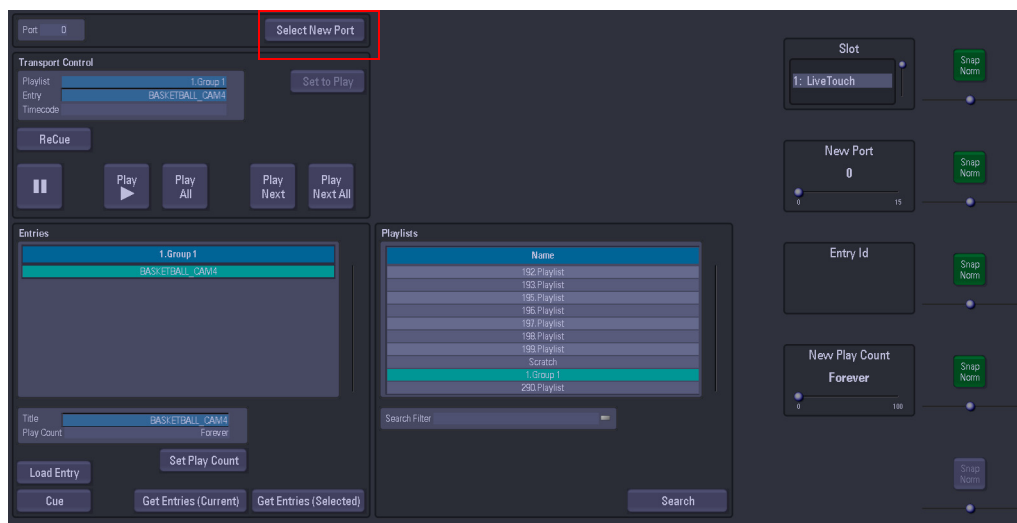
To select a new port to control, touch the **{Select New Port}** button. In the "Transport Control" panel, if the "Port" is idle, touch the **{Set to Play}** button to change the port to playout mode. While in playout mode, it shows the current "Playlist", "Entry" and "Timecode".

Buttons:

Recue - Recue current entry

Pause - Pause current entry

Play - Play current entry

Play All - Play from current entry till the end of the playlist

Play Next - Play the next entry

Play Next All - Play from next entry till the end of the playlist

Playlists Panel:
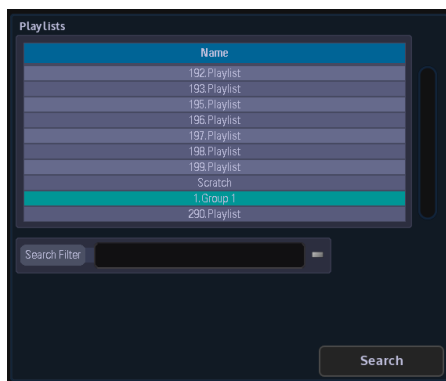
To use the PlayLists search, type in a keyword in "Search Filter" and touch the **{Search}** button. This will find play lists for the current port, i.e. type in "Kahuna" and the search will list all

playlists contain the word "Kahuna" in the title.

Leave "Search Filter" blank, and when the **{Search}** button is pressed, the search will list all play lists available for the current port.

Entries Panel:
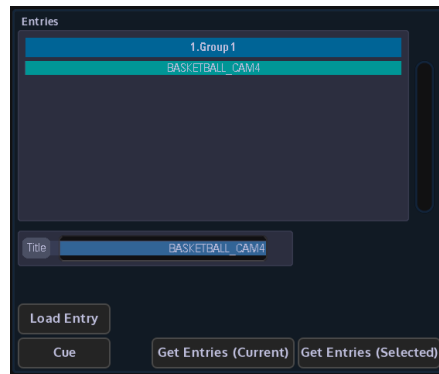
Touch the **{Get Entries (Current)}** button to get the entries of the current playlist. The current playlist is displayed in the "Transport Control" panel above. The other way is to touch the **{Get Entries (Selected)}** button to get the entries of the selected playlist in the "Playlists" panel. The title of the playlist is displayed at the top of the list.

To play and entry, select an entry and touch the **{Load Entry}** button. This entry will not have any on air effect until the subsequence "Cue" or "Play Next" buttons press

DVE

Introduction to DVE

The Kahuna mainframes can support up to 5 DVE cards that will offer the user a range of visual effects.

Each DVE card supports 4 independent DVEs, which have tiles freely assigned to them. The DVE card generates four tiles, each tile has two surfaces, the surfaces are fed by a range of sources; Stores, Mattes, Washes, Util Buses, M/E Outputs and Input sources to the mainframe etc.

Sources are assigned to the surfaces of the tiles within the menu structure, which will be discussed later in this section.

The DVE models are all created using tiles, however, certain models may not utilize all 4 tiles, the DVE models when selected will automatically assign the correct number of tiles to the selected model, as long as the user has assigned enough tiles to the delegated DVE.

The DVE is designed to work in three modes, **Source** based, **Bus** based and **DVE Aux** based.

In Source based mode the DVE appears as a source to the switcher.

These can be differentiated between, by the point at which the DVE enters the switcher.

Source based DVE transforms will be applied by the switcher before any Key adjustments are added.

Note: DVE setup and use in this section of the manual will have a description for using the MAV-GUI menus and a description using the GUI menus.

Understanding How DVE Models Move

X, Y, Z Axis and X, Y, Z Rotate

The DVE model or Tile uses three axis to move around, X (horizontal), Y (vertical) and Z (depth) as shown below. The positioning of a DVE Model or Tile can also be altered by adjusting X, Y, Z Rotate.
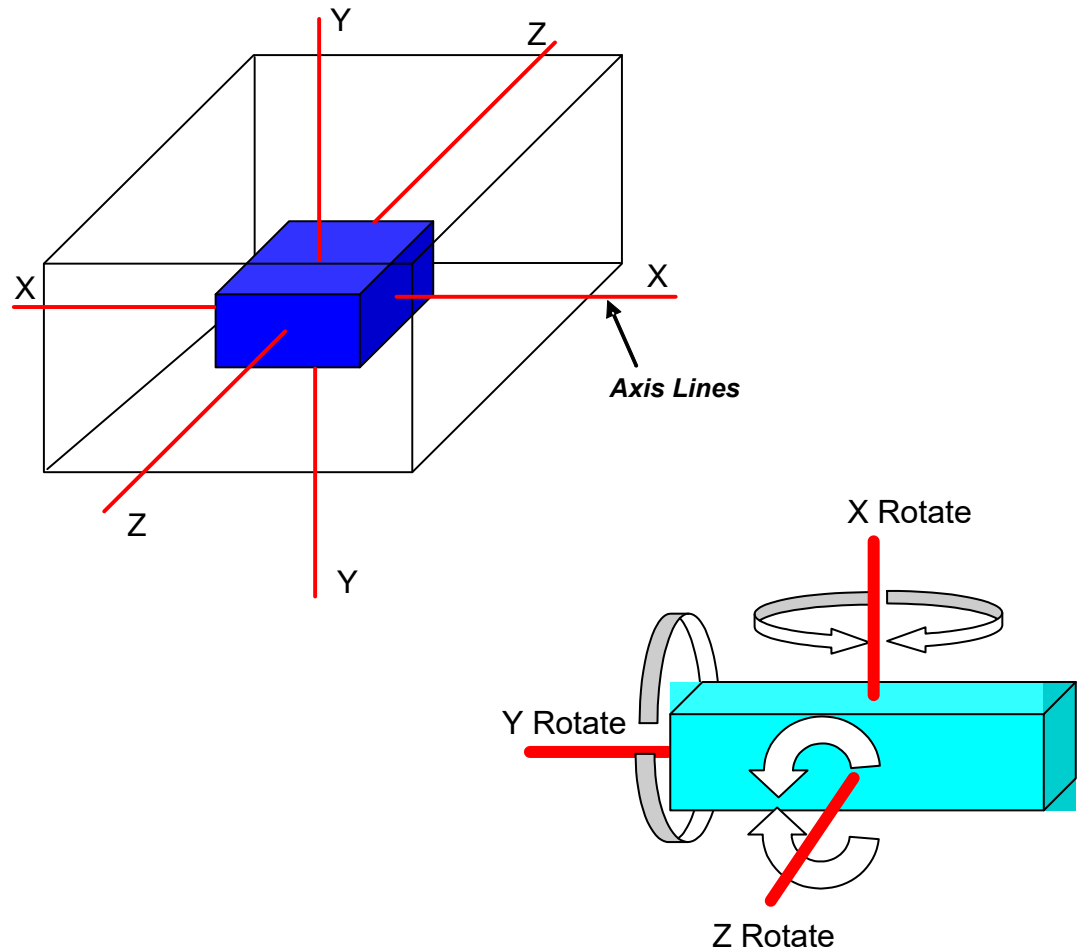
Source and Target Adjustment

It is also worth noting that when moving a DVE model or Tile, the model will always move around a central point in space.
To understand this the parameters options are broken down into types of adjustment - Source and Target.
Main Transform - Target (global) - DVE Model or Tile PLUS the whole surrounding area.
Pre Transform - Source (local) - which is just the DVE Model or Tile etc.
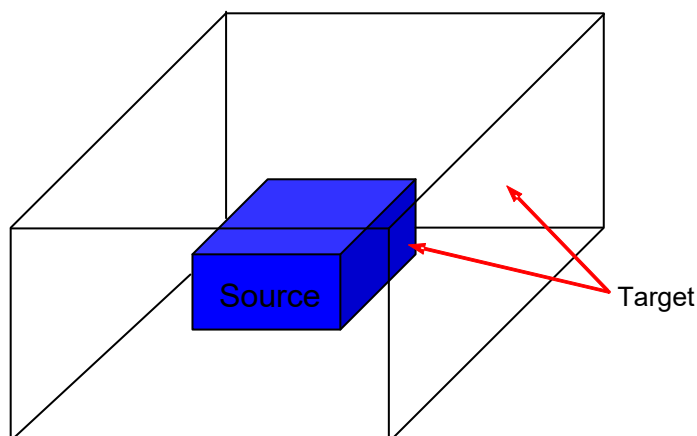
DVE Tile Assignment between Logical Switchers

The DVE cards fitted to the Kahuna mainframe each have 4 tiles that can be freely assigned between logical switchers in the **Switcher Configuration/Configuration DVEs** menu. This will allow the DVE resource to be shared if a single Kahuna mainframe has been setup to work as more than one logical switcher.

To get to the **Configuration DVEs** menu, either **Log Off** the switcher to get back to the **Connect** menu, or switch on the mainframe and the first menu to appear will be the **Connect** menu.
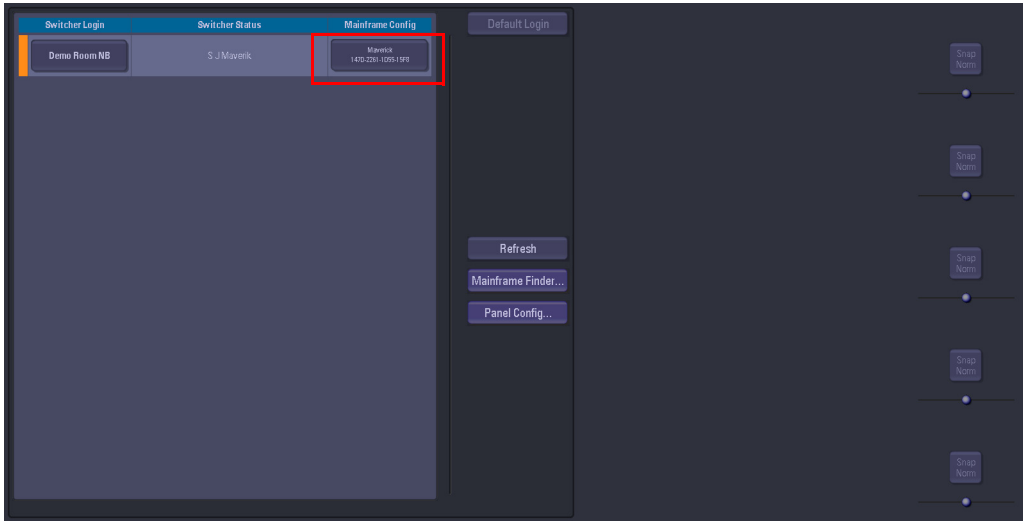
Press the mainframe button in the Mainframe Config menu (shown above right) which will then enter the **Login as Operator** menu.

Touching one of the icons will take the user to a set of sub menus which allow the user to enter the Switcher Config menu.

> Note: If no administrator accounts have been setup, this menu will be bypassed and the first menu to appear will be the **Mainframe Configuration** menu.
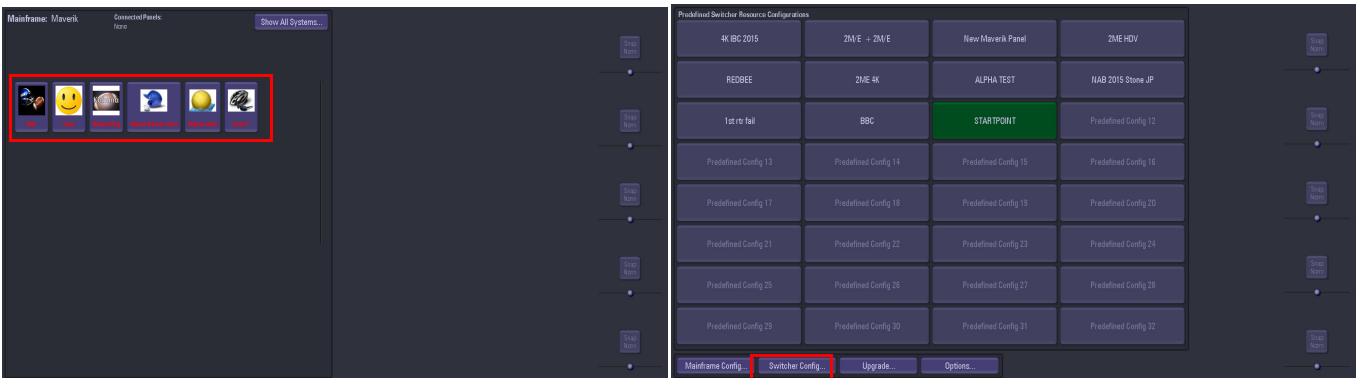
In the **Mainframe Configuration** menu press the **{Switcher Config...}** button to enter the **Configuration - Summary** menu (shown on the next page).

This menu displays all the resources allocated to logical switchers, at a glance, the user can see the DVE tiles allocated. There are four DVE Tiles per DVE card fitted in the mainframe.
Press the **{DVEs...}** button to enter the Configuration DVEs menu.

The menu displays the number of DVE cards fitted to the mainframe and how the DVE Tiles are allocated across logical switchers.

Notice that there are 4 DVE Tiles in each DVE card slot in the DVE Tile Assignment column, any of these DVE Tiles can be assigned to other switchers, by simply touching the Green DVE tile buttons to turn them gray, then use the Logical Switcher parameter to select one of the other 15 switchers in the table and touch the DVE tile button once again it will turn green indicating that the DVE tile has been selected and assigned to the selected switcher.

If the DVE tile button is Gray and has a cross on it, this means that the DVE tile is assigned to another logical switcher.

Note: When any changes are made to the **Configuration DVEs** menu, a warning dialog box will be displayed asking the user if the changes are to be **Saved** or **Discarded**.

Assigning Tiles to DVEs

The next step in setting up the DVE is to assign tiles to DVEs, this will allow the user to place a number of tiles in one DVE to be used with the available DVE Models, or to spread the tiles across the 4 DVEs. To do this the user has to log back into the logical switcher, and then touch the **{USER CONFIG}** button on the GUI.
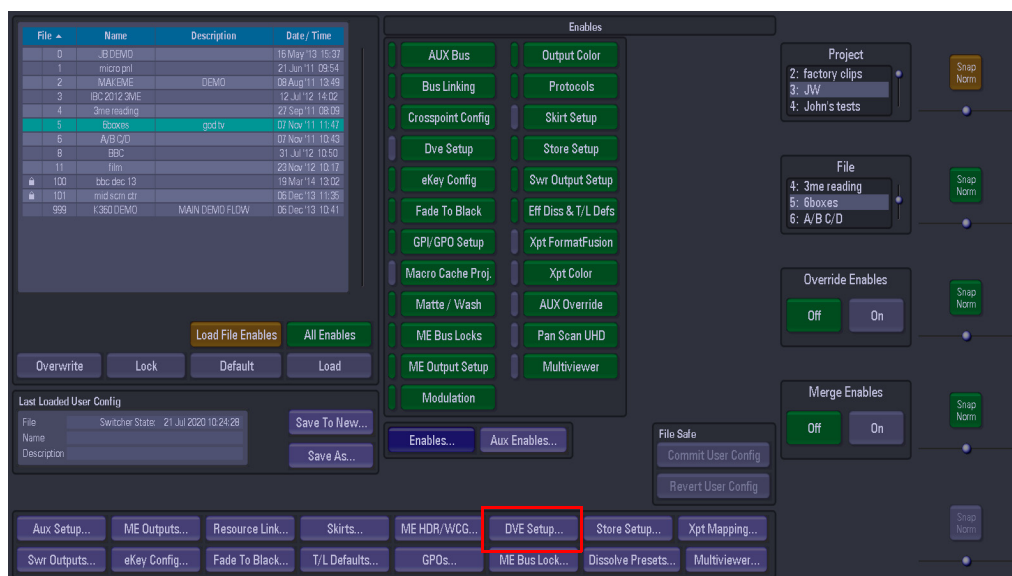
In the **User Config** menu press the **{DVE Setup...}** button.
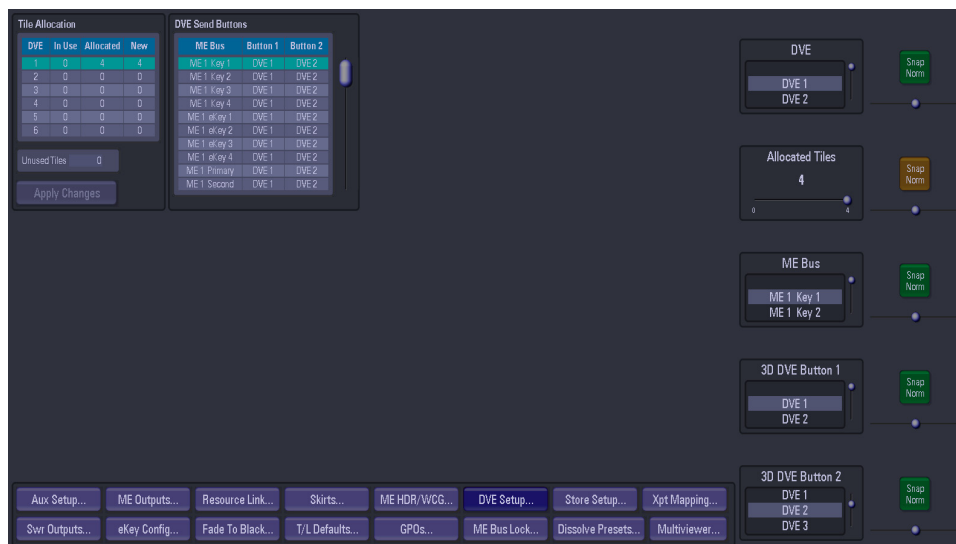
In this menu the user is able to allocate tiles to DVEs.

0.0.1 DVE Tile Allocation

The Tile Allocation table displays the DVEs that have been allocated to the switcher, in the diagram below all 4 DVEs have been allocated to this logical switcher. The table also displays the number of tiles allocated to each DVE.

Displays DVEs and Tiles allocated to the DVEs

The number of tiles allocated to a single DVE will dictate the number of DVE models that can be used with that DVE. Some DVE models will require 2 tiles, others will require 3, so it is important to know how many tiles to allocate.

To allocate tiles to DVEs, use the **DVE** parameter to select a DVE, and then use the **Allocated Tiles** parameter to set the number of tiles. As the Allocated Tiles parameter is adjusted notice that the **{Apply Changes}** button turns orange, press the **{Apply Changes}** button and the tiles are allocated.

The **Tile Allocation** table displays:

DVE - The number of DVEs in a Logical Switcher

In Use - The number of Tiles being currently used by a DVE model

Allocated - The number of Tiles allocated to the DVE

New - Displays how many tiles are going to be allocated to the DVE

The **Unused Tiles** box displays the number of tiles that are free to be allocated

DVE Outputs to Crosspoint Outputs

The easiest way to setup the DVE outputs to crosspoints on the control surface is by using the **Panel Config - Button Maps** menu.
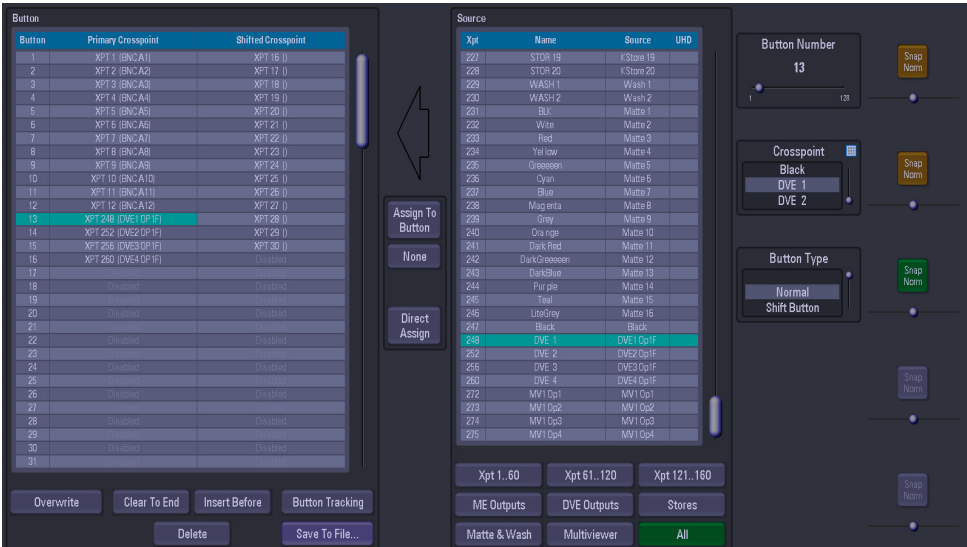
In the "**Edit Button Map File"** source table allows the user to quickly set a DVE Output to a crosspoint button and allocate the button map to an M/E and M/E bank.

> Note: See **Panel Config - Button Maps** section of the manual for complete button map setup information.

DVE Model and Tile Menus

The menu below displays DVE 1 is selected and that 4 Tiles have been allocated. The user now has the choice of selecting (Active Individual) tiles as the DVE effect, or select one of the Active Models to create the DVE effect.
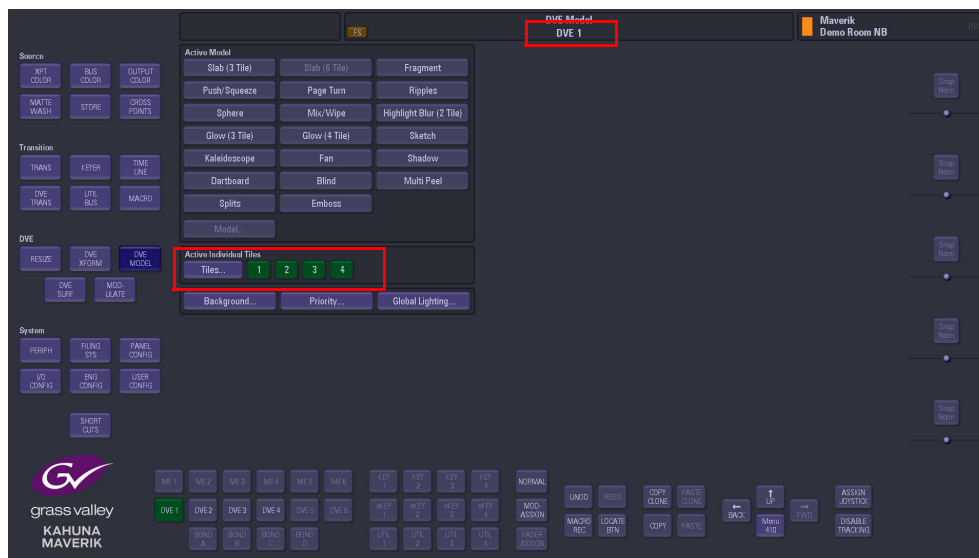
DVE Model - Tile (Background)

This menu allows the user to apply a background behind the DVE Tile or Model without the need for using a Key Layer.

DVE Background Selection

With the Background parameter turned On, use the Bus Insert mode to select between Source based or Bus Feed A/B as the background. Then use the Source Mode parameter to select Crosspoint or DVE Aux 1 to 16 as the background behind the DVE model or Tile.
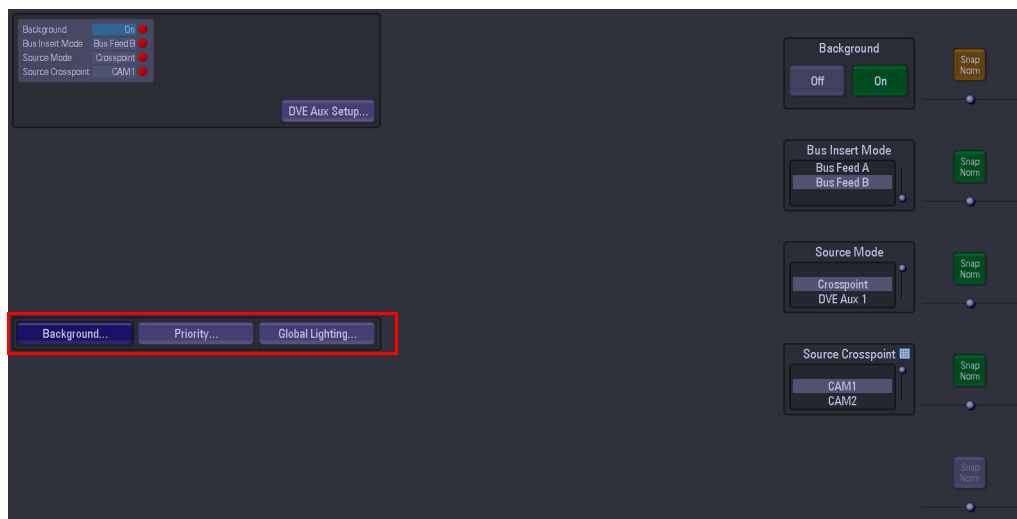
If Crosspoint is selected as the source, then the Source Crosspoint parameter is used to select the source for the background, which can be Xpts, Mattes and Washes, M/E outputs, Stores etc.

> Note: Use the popup selector for easy selection of the crosspoint source.

DVE Page Turn Model with DVE Aux feeding the background

Tile Priority and Intersection of DVE Tiles

DVE Tiles have a priority order set as a factory default. This menu allows the user to change the tile priority for each tile to a user defined state.

> Note: This menu shows priority for 4 selected tiles who's priority order can be adjusted.
> This would be N/A if a DVE Model was selected instead of tiles.

DVE Priority

Adjust the Tile Selector to select a tile, them adjust the Tile Priority parameter to move the tile up or down in the priority list.

The Priority menu also allows "Intersection" of tiles, with the **Intersect Tiles** parameter set to "Yes" DVE intersection between tiles can now be achieved as shown below.

> Note: Intersect Tiles is set to "Yes" by default

The **Intersect Softness** parameter will soften the edge where the two tiles intersect. Notice the difference between the intersecting edges on the top intersecting tiles and the bottom tiles, where the bottom two tiles Intersect Softness is set at 50%.

DVE Tiles Intersecting

DVE Tiles Intersecting with Intersect Softness at 50%

Global Lighting

Global lighting will apply a lighting affect to all DVE Tiles at the same time or lighting to a selected Model.

This menu can add two individual light sources to the DVE Tiles or Models, Light 1 adds one light source and obviously Light 2 adds the second.

The two light sources can be moved completely independently of each other.

> Note: To save repeating information, the information below will describe using Light 1 parameters to control the light source, light 2 has exactly the same controls

Light Control

This menu can add two individual light sources to the DVE Tiles or Models, Light 1 adds one light source and obviously Light 2 adds the second.

The two light sources can be moved completely independently of each other and the color of the light source can be changed using the Matte 1 and Matte 2 parameter controls.

> Note: To save repeating information, the information below will describe using Light 1 parameters to control the light source, light 2 has exactly the same controls

Lighting - this turns the Lighting function On/Off

Intensity - controls the overall lighting effect. 100% is the default setting, as the parameter is wound down to 0% the light source starts to disappear.

Light Type - this changes the type of light source, select either Round or Bar light source.

Invert - will invert the source on the tile making the tile intensely white with just the surface showing where the light source was.

Diffuse Level - will change the intensity of the diffused light

Width - will change the width of the diffused light. Try turning the Softness parameter down to 0%, this will display the outer edge of the diffused light. Then adjusting the width towards 100% will move the outer edge beyond the limits of the monitor.

Softness - will change the softness of the diffused light from the outer edge inwards, 0% will display a hard edge.

Flashlight - as the name depicts, this will simulate a flashlight light source

DVE Tiles 1 to 4 with Global Lighting applied (Bar Light Effect)

Specular Level and **Shine** - these control the glossy or specular element of the lighting.

Shine - controls the size of specular highlights created, 100% being a high gloss surface.

Glint mode adds a specular highlight that flashes across a tile, an example would be to swinging a flashlight across a surface in the dark.

Bar Rotation - this will rotate a bar light around 360 degrees

Ambient Level - this controls the 'room' lighting, flooding the whole tile with light.

Light 1 Location and Orientation:

Position X,Y,Z - sets the location of the light source around the DVE Surface coordinates

Direction X,Y,Z - sets the vector direction that the light is pointing in.

Set Location & Orientation using a Tile

This allows the user to move the light source for individual tiles. The menu also allows the user to specify where on a tile the light will hit, at what angle and from what distance. The light 'Location and Orientation' is then automatically setup by the software.

Follow Tile - switches the "Follow" function On/Off

Tile Number - selects the tile

Hit Point X, Hit Point Y - specifies where the 'line of sight' of the light will hit the tile. 100% represents the width of a tile.

Azimuth & Elevation - this is the angle that the light hits the tile. Elevation is how 'upright' this angle is and azimuth is the 'around' direction.

Distance - how far, along the 'line of sight' direction, is the light away from the tile.

Light Matte 1:
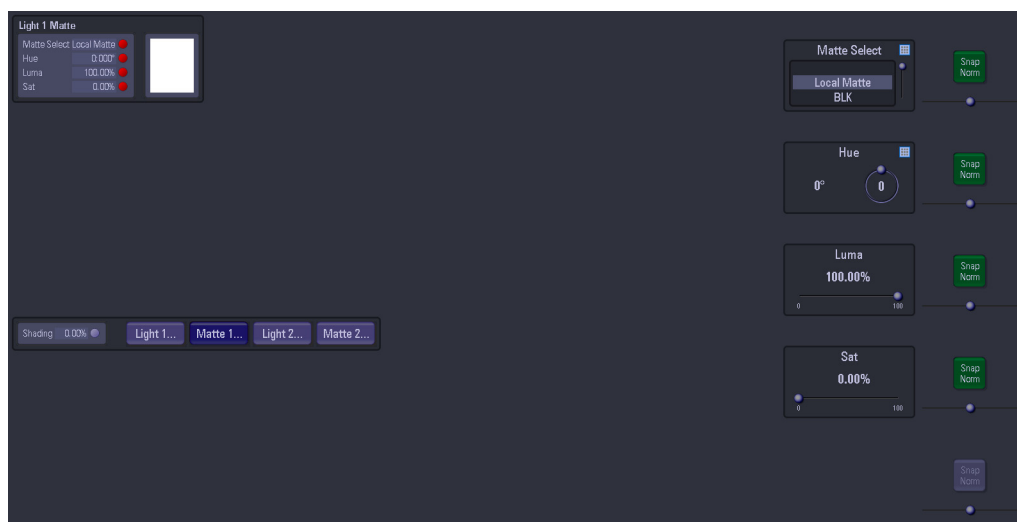
Matte Select - sets the color of the light source, allowing the user to set a defined color for the light source.

Local Matte - allows the light color to be adjusted using the Hue, Luma and Sat parameters.

The DVE Tile Menu

In the DVE model main menu, touch a tile to select it, them press the **{Tiles...}** button to enter the **DVE Model - Tile Main** menu. Selecting one of the Tiles by pressing a tile button (shown below) will turn the tile button green making the tile active. If the control surface has been setup with DVE 1 O/P1 as the selected crosspoint, the selected tile should now be displayed on the monitor.

Pressing the **{Tiles...}** button will open the **DVE Model - Tile (Main)** menu, this menu will allow the user to adjust the DVE Tile parameters to create the required DVE effect.
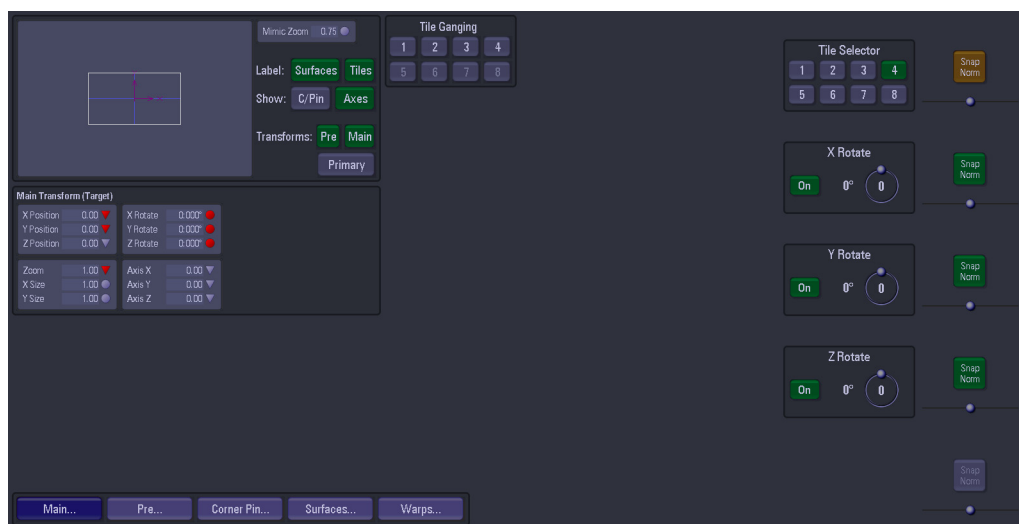
All Tiles Active (assigned to 1 DVE)

If all 4 tiles have been allocated to a single DVE then all 4 tiles will be available to select and place on a monitor, when this happens the DVE Model - Tile menu will display all 4 tiles at the top left of the menu. Each one can be individually selected and adjusted.

Allocating Sources to Tile Surfaces

Before adjusting the DVE Tile parameters, it is important to know how to set the source information for each of the Tile Surfaces, tiles have 2 surfaces a **Front Surface** and a **Back Surface** and the DVE Surfaces menu is where the sources are set up for each tile surface. Allocation of the surfaces to the tiles will be explained later in the DVE Model - Tile menu.

Note: The full explanation of the DVE Surface menu will follow later in this section.
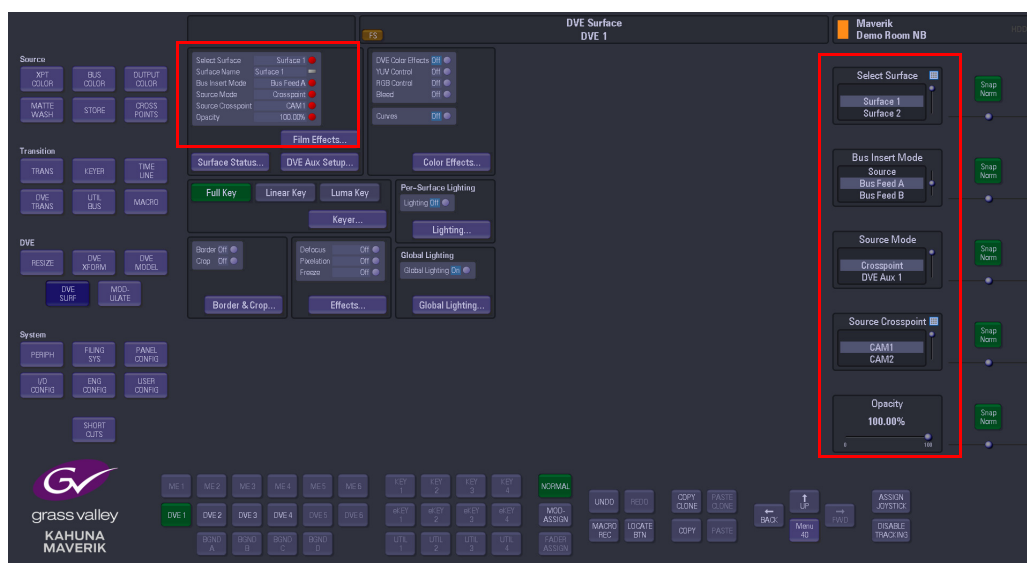
In a Source based DVE the user allocates sources for the DVE tile surfaces using the **Source Mode** and **Source Crosspoint** parameters as shown above. Remembering that the DVE tiles have 2 surfaces (front and back), this will mean that if all 4 tiles are being used, up to 8 surfaces may need different sources.
Use the **Selected Surface** parameter to select the required surface, set the **Bus Insert Mode** parameter to **Source** and use the **Source Mode** parameter to select the source for that surface, it is as simple as that.

You can see what sources have been allocated to surfaces in the "**DVE Surface - Status**" menu, as shown below.

Source for
Surface
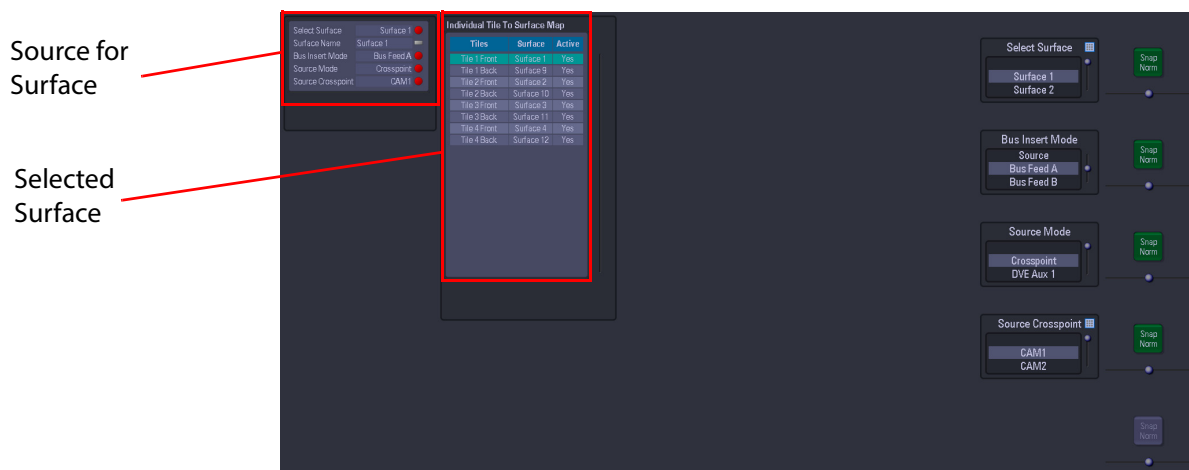
Selected
Surface

DVE Model - Tile (Main) menu

This menu is the Main Transform (Target) menu, which moves the selected Tile "Globally" around a central point, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the Tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.
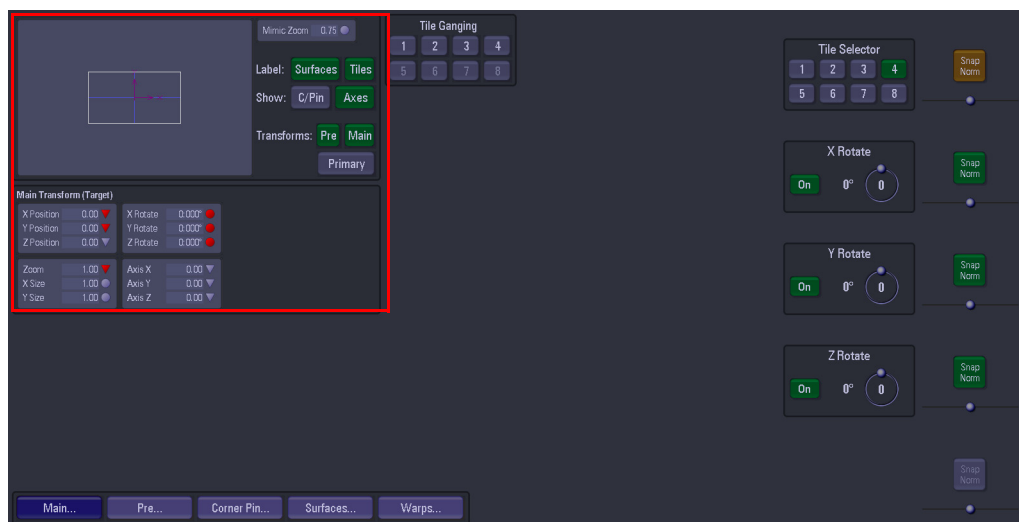
Tile Mimic top right will mimic the adjustments made in the Main Transform (Target) parameters below. Notice that when the parameters are adjusted, the tile will move around a central point in space.

Main Transform (Target)

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the Tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Mimic Controls

Mimic Zoom - allows the mimic model in the menu to be zoomed in or out for easier viewing.
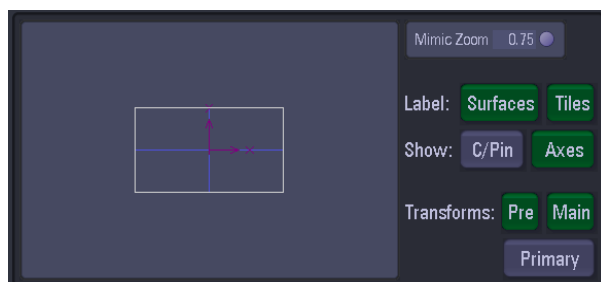
Label

Surfaces - enables/disables the word "Front" or "Back" in the bottom left corner of the tile mimic depending on which side of the tile surface is being displayed at the time.

Tile - enables/disables the word "Tile" in the top left corner of the tile mimic.

Show

C/pin (Corner Pin) - enables/disables the mimic displaying the changes made to the tile in the **Surfaces - Corner Pin** parameters

Axis - enables/disables the axis display in the tile mimic, the Axis display will be purple or blue color depending if Pre or Main is selected.

Transforms

Pre (Source), **Main** (Target), alters the tile mimic to display any changes made to the tile in the Pre and Main menus.

Without **Main** enabled in the Main Transform (Target) menu, the mimic will not move when the parameters are adjusted.

Without **Pre** enabled in the Pre Transform (Source) menu, the mimic will not move when the parameters are adjusted.
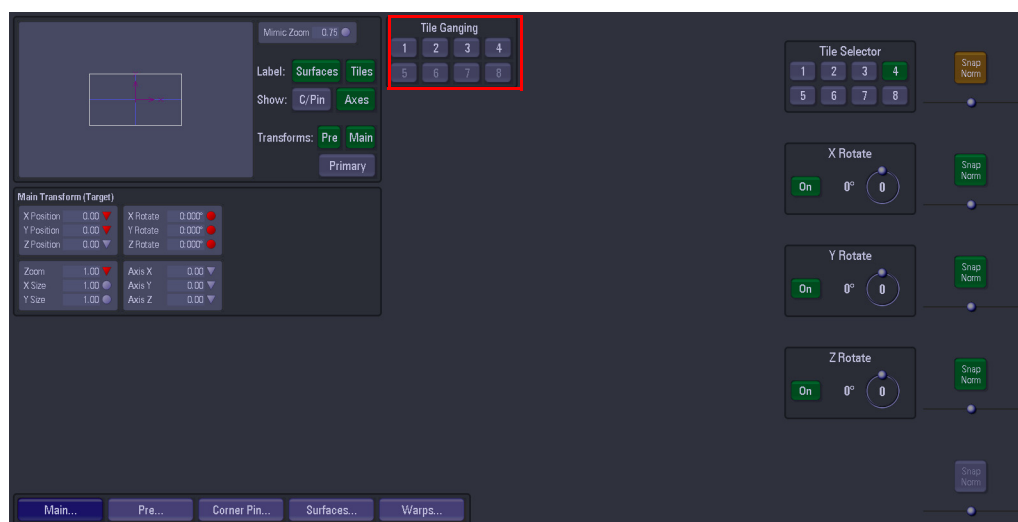
Tile Ganging - when tiles are selected in the **Tile Ganging** parameter, any adjustments made in any of the Tile menus will affect the selected tiles. For example; if all 4 tiles are selected as shown in the menu above, if the Zoom parameter is adjusted then all 4 ganged tiles will zoom in or out when the parameter control is turned.

DVE Model - Tile (Pre)

This menu is the **Pre Transform (Source)** menu, which moves the selected Tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.
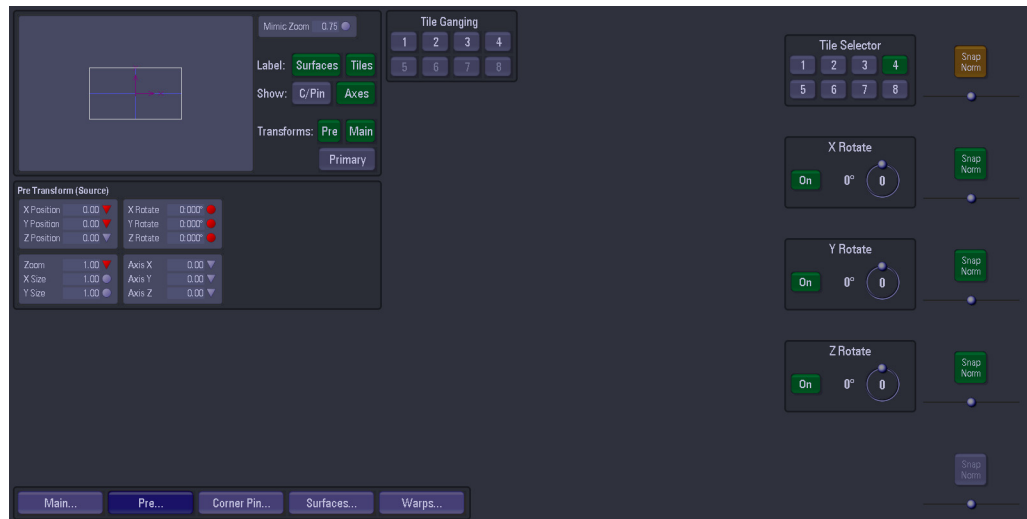
The Pre Transforms (Source) parameter controls are exactly the same as described in the Main Transform (Target), but as they are adjusted, the mimic will show the tile moving around its own axis.

DVE Model - Corner Pin

This part of the menu allows the user to change each corner of the tile, the corners can be moved independently of each other to distort the tile into any four sided shape.
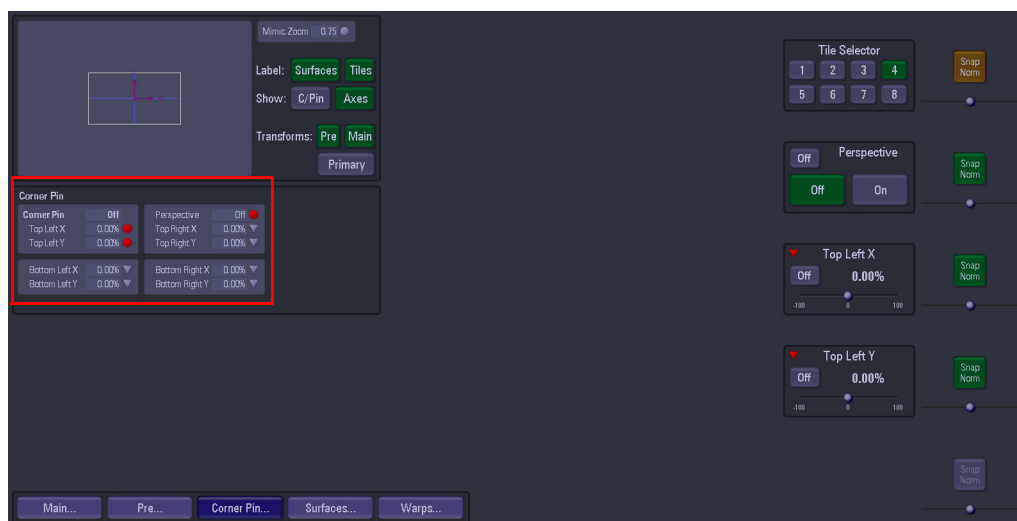
Corner Pin Parameters

Top Left/Top Right X/Y - will pull the tile corners out or push them in; depending on which way the parameters are adjusted.

Bottom Left/Bottom Right X/Y - will pull the tile corners out or push them in; depending on which way the parameters are adjusted.

Perspective Off/On - Perspective will alter the center point of the tile, to give the impression of distance.

Example of Corner Pinning on 2 Tiles

DVE Model - Tile Surfaces

This menu allows the user to apply surfaces to the front and back of selected tiles, apply Corner Pinning and adjust the orientation of the surface of the tile.
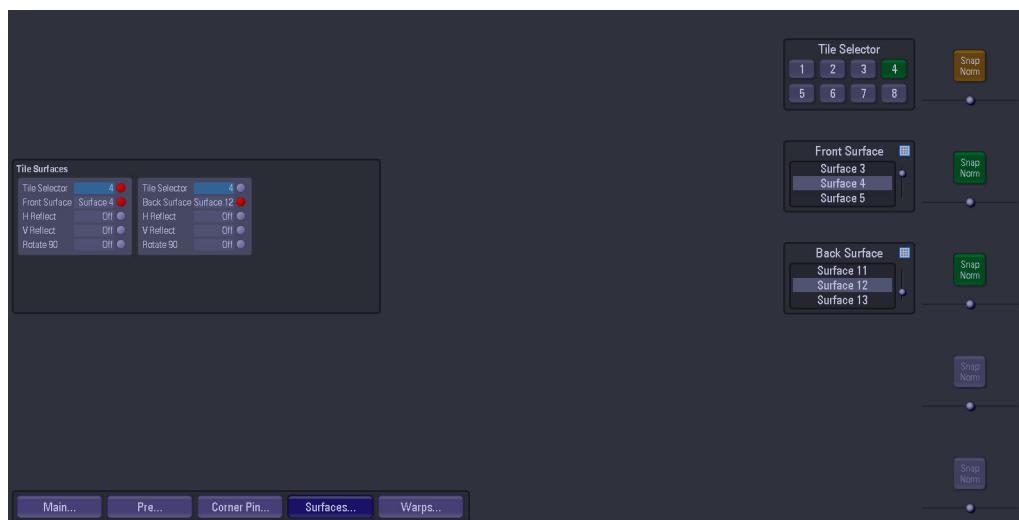
Use the Front and Back parameter controls to select a surface for the selected tile.

Tile Surfaces

Tile Selector- allows the user to select different tiles if more than 1 tile has been allocated to a DVE and the tiles are turned **On**. The Tile Selector top right of the menu will display the number of tiles available.

Front Surface/Back Surface - determines the surface of the selected Tile.

Front/Back H/V Reflect - the source on the front and/or back of the surface may be reflected in the horizontal or vertical direction, this maybe useful when rotating a tile to have the front and rear source in the same orientation.

Rotate 90 - this will rotate the surface by 90°

Warps

The Warp menu allows the user to apply various effects to individual tiles.

To use the Warp functions, touch the **"Tile Selector"** attacher and turn **Warp On.**
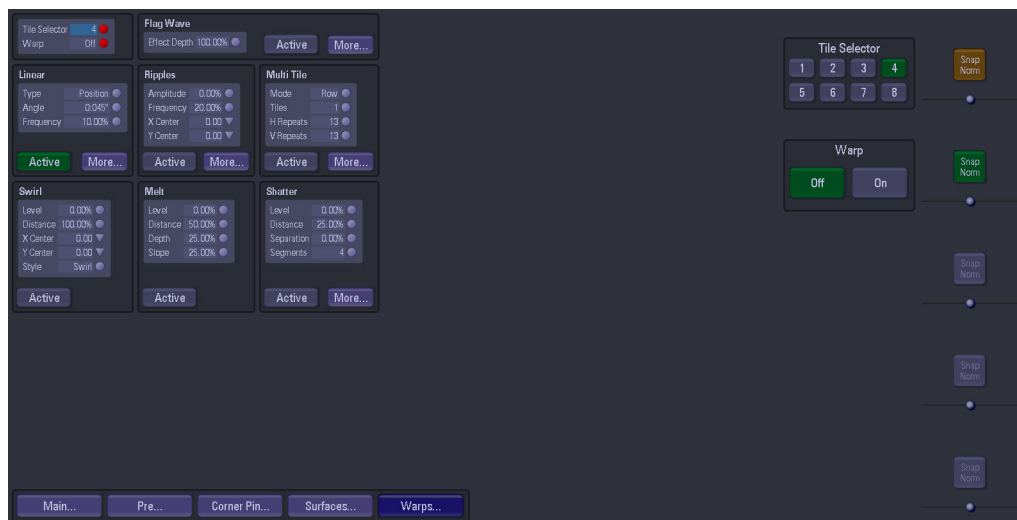
Linear

This effect allow linear lines of warping effects to be applied to a DVE tile.
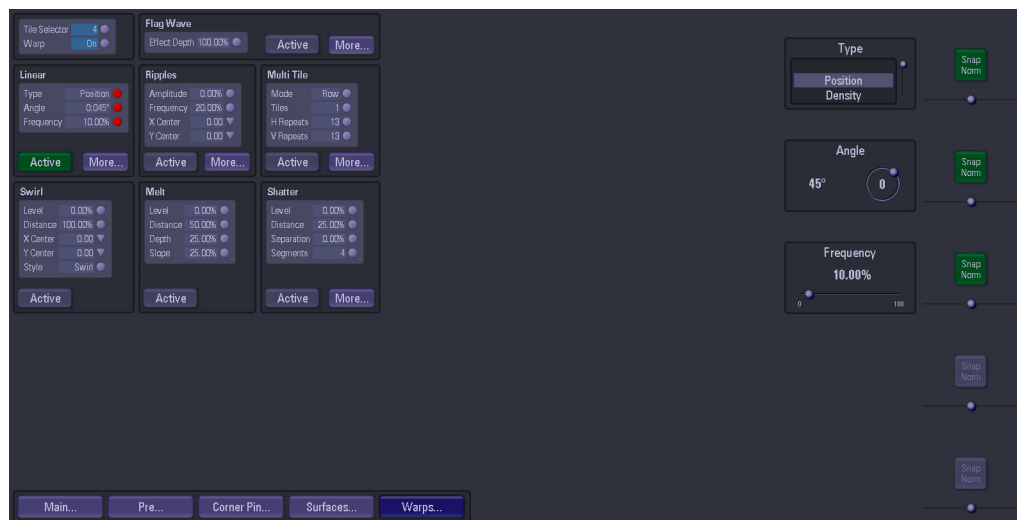
Main menu adjustments:

Type - selects between the three states of Warp, Position, Density and Independent.
They all have a similar effect on a tile, it is down to the user's discretion which one to use to create the desired effect on a tile.

Position - moves the DVE Tile pixels in the direction of the angle, according to the Shape pattern chosen

Density - stretches or squashes the width of each DVE Tile pixel perpendicular to the angle, in accordance with the Shape pattern chosen.

Angle - decides what rotation is applied to the effect

Frequency - determines how often the warp is applied to the tile
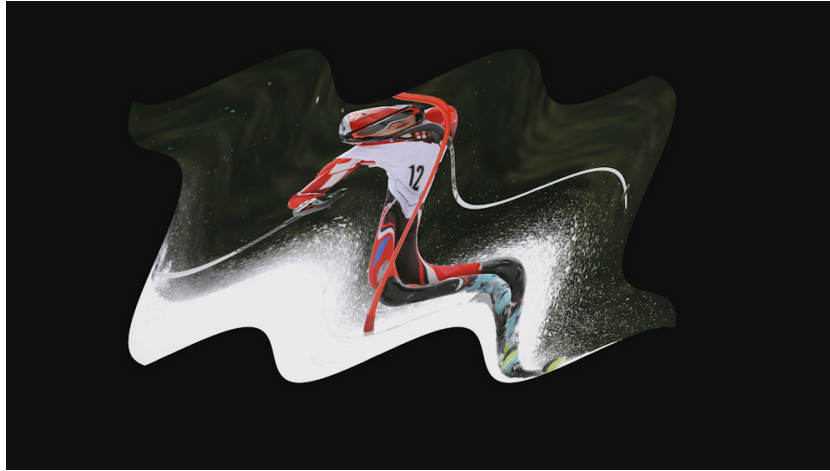
Example of Position Warp as a Sine shape

{More…} menu
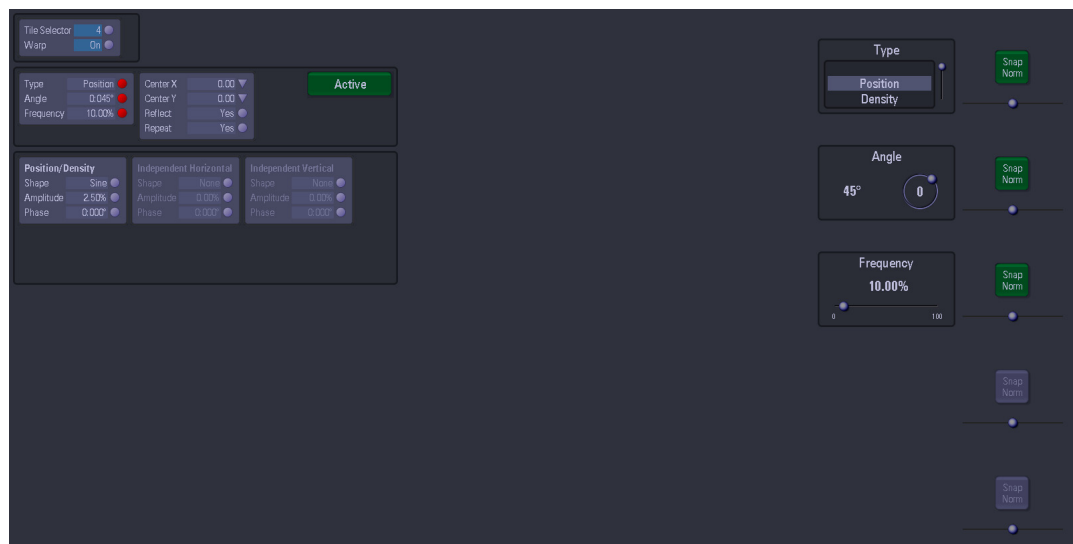
Type - selects between the three states of Warp - Position, Density and Independent

Angle - decides what rotation, is applied to the effect

Frequency - determines how often the warp is applied to the tile

Center X - determines the center of the warp, on the X-axis

Center Y - determines the center of the warp, on the Y-axis

Reflect - when set to Yes applies a warp to the entire tile, when set to No will warp one half of the tile

Repeat - when set to Yes the warp pattern is repeated throughout the tile, when set to No the warp pattern will appear only once.

Independent Vertical Warp in Square Shape setting

Independent Horizontal/Independent Vertical - (these parameters will only work when the "**Type**" parameter is set to Independent) these are a secondary adjustment to the linear warp. They allow the user to have individual control over both the Horizontal and Vertical Warp settings of each tile these attachers control the Shape, Amplitude and Phase of the Warp.

Shape - determines the shape of the edge of the Warp effect in Position mode, (eg. Sine = sine curve cycle) and the shape of pixel-width spread in Density mode

Amplitude - controls the intensity of the 'Shape cycle', the larger the amplitude the more dramatic the warp

Phase - adjusts the warp starting point within the 'Shape cycle'

Ripples

This adds a Ripple effect to a tile.

Amplitude - controls the intensity of the 'Shape cycle', the larger the amplitude the more dramatic the Ripple

Frequency - determines how often the Ripple is applied to the tile

X Center - moves the Ripple center left or right

Y Center - moves the Ripple center up or down

Ripples Warp with Amplitude and Frequency turned up

Ripples **{More...}** menu.
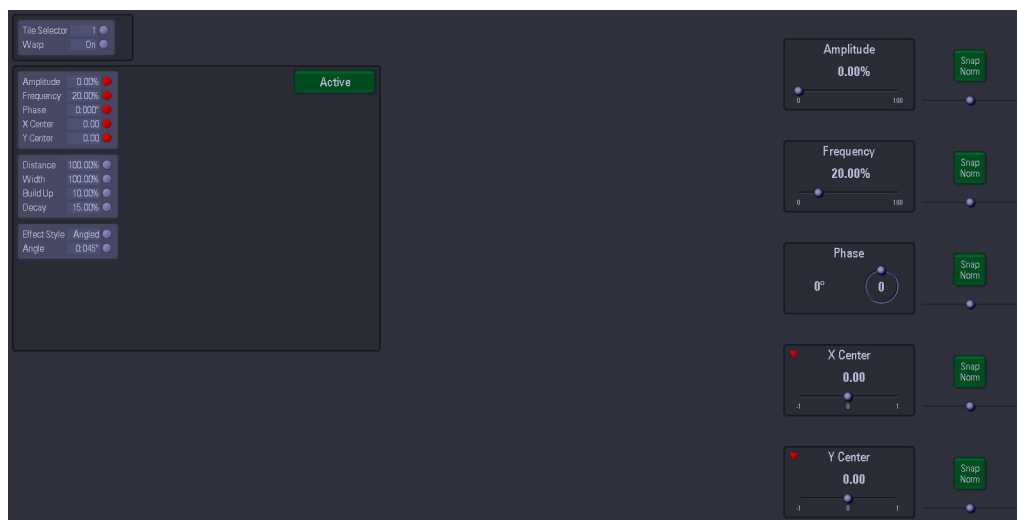
Amplitude - controls the intensity of the 'Shape cycle', the larger the amplitude the more dramatic the Ripple

Frequency - determines how often the Ripple is applied to the tile

Phase - adjusts the warp starting point within the 'Shape cycle'

X Center - moves the Ripple center left or right

Y Center - moves the Ripple center up or down
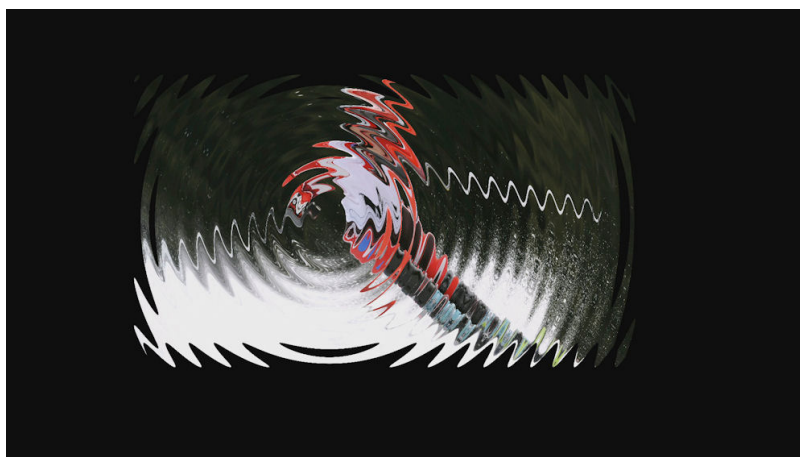
Ripple Warp with X Center adjustment

Distance - sets how far the Ripples spread outwards from its center

Width - sets the width between the Ripples

Build Up - applies a softness between the outside ripple and the rest of tile

Decay - applies a softness from the center of the ripple outwards

Effect Style - selects between Angled and Radial effects

Angle - decides what rotation, if any, is applied to the Ripple.

Multi Tile

This menu allows a selection of multiple tile DVE effects to be displayed.

Mode - The multi tile modes as listed below:

- **Row** - Tiles 1 - 8
- **Column** - Tiles 1 - 8
- **Grid** - Tiles 1, 2, 4, 6 - 2X3, 6 - 3X2, 8 - 2X4, 8 - 4X2

Horiz Repeats - his will repeat tiles from 2 times up to 14 times horizontally.

Vert Repeats - this will repeat tiles from 2 times up to 14 times vertically

As shown in the previous menu.

Mode - The multi tile modes as listed below:

- **Row** - Tiles 1 - 8
- **Column** - Tiles 1 - 8
- **Grid** - Tiles 1, 2, 4, 6 - 2X3, 6 - 3X2, 8 - 2X4, 8 - 4X2

Reflected - will add a reflected view of the multi tile setup

Horiz Repeats - his will repeat tiles from 2 times up to 14 times horizontally.

Vert Repeats - this will repeat tiles from 2 times up to 14 times vertically

Horizontal Separation - spreads spaces horizontally in between the selected multi tile pattern

Vertical Separation - spreads spaces vertically in between the selected multi tile pattern

DVE Multi Tile with 13 Horiz/Vert tiles

Flag Wave

Flag Wave is a multi tile Warp effect that simulates a flag waving in the wind.
Once the Warp function is turned On, press the **{Active}** button then Flag Wave will start at a preset level.
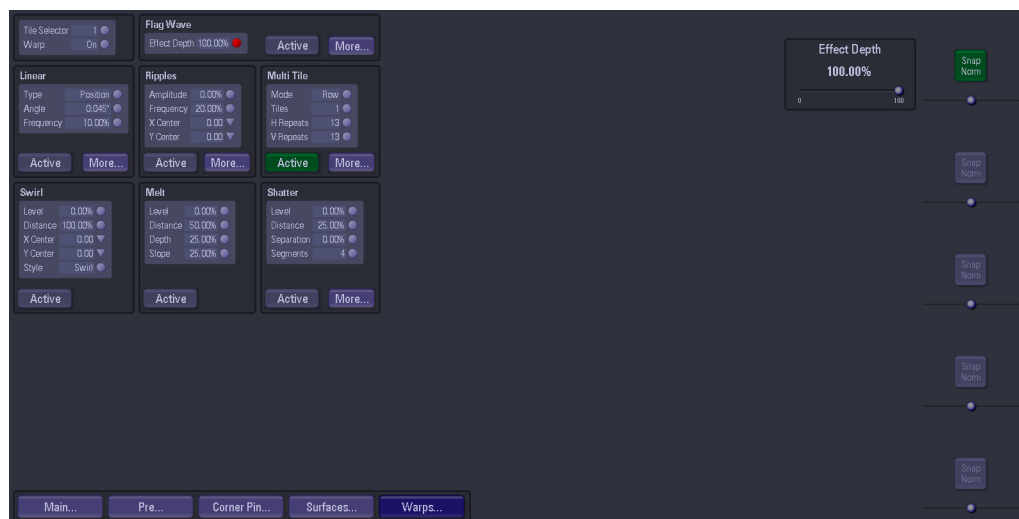
Effect Depth parameter is a coarse **"frequency"** adjustment, 0% will stop the flag wave motion, and 100% is at maximum level.
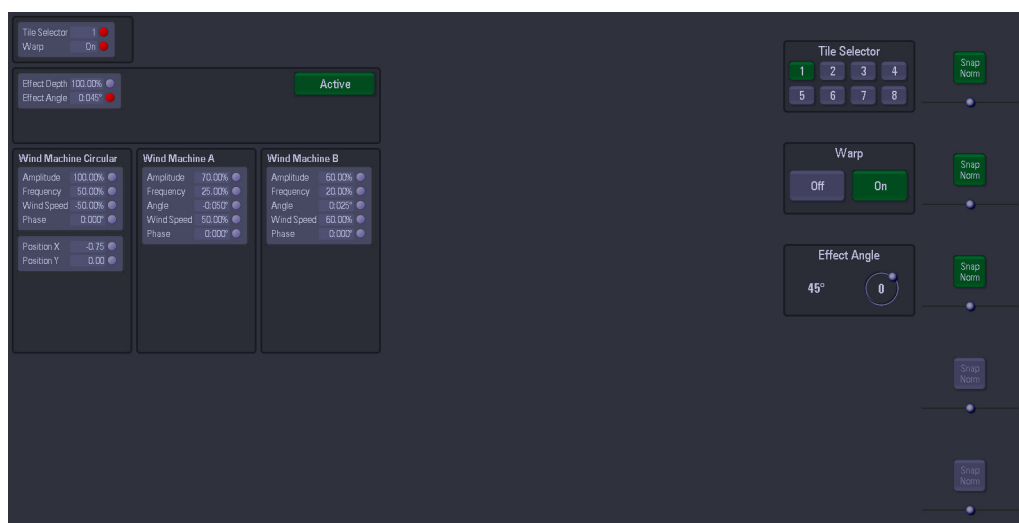
The menu above shows that the Flag wave warp is On and that it is affecting Tile 4, the Effect Depth and Effect Angle are both coarse adjustments, the Effect Depth is the same adjustment as explained in the previous menu.

Effect Angle - adjusts the angle at which the wind hits the tile

Wind Machine Circular creates a curved edge to the Wind Ripple effect as it passes over the tile.

Amplitude - controls the intensity of the 'circular shape cycle', the larger the amplitude the more dramatic the wind ripple

Frequency - determines how often the wind ripple is applied to the tile

Wind Speed - this adjusts the wind speed and wind direction, the preset level is left to right at 50%, if the parameter is changed to +100% the wind direction is from right to left at maximum speed

Phase - adjusts the warp starting point within the 'circular shape cycle'

Position X and Position Y - this moves the center point at which the circular wind ripples start

Wind Machine A and **Wind Machine B** provide the same Wind Ripple effect, but can be adjusted allow wind ripples to hit the tile from different directions, the only difference between, the adjustment they provide and the Wind Machine Circular is the Angle adjustment.

Amplitude - controls the intensity of the 'circular shape cycle', the larger the amplitude the more dramatic the wind ripple

Frequency - determines how often the wind ripple is applied to the tile

Angle - this changes the angle at which the wind ripples strike the tile

Wind Speed - this adjusts the wind speed and wind direction, the preset level is left to right at 50%, if the parameter is changed to +100% the wind direction is from right to left at maximum speed

Phase - adjusts the warp starting point within the 'circular shape cycle'

Swirl

This adds a Swirl effect to a tile.
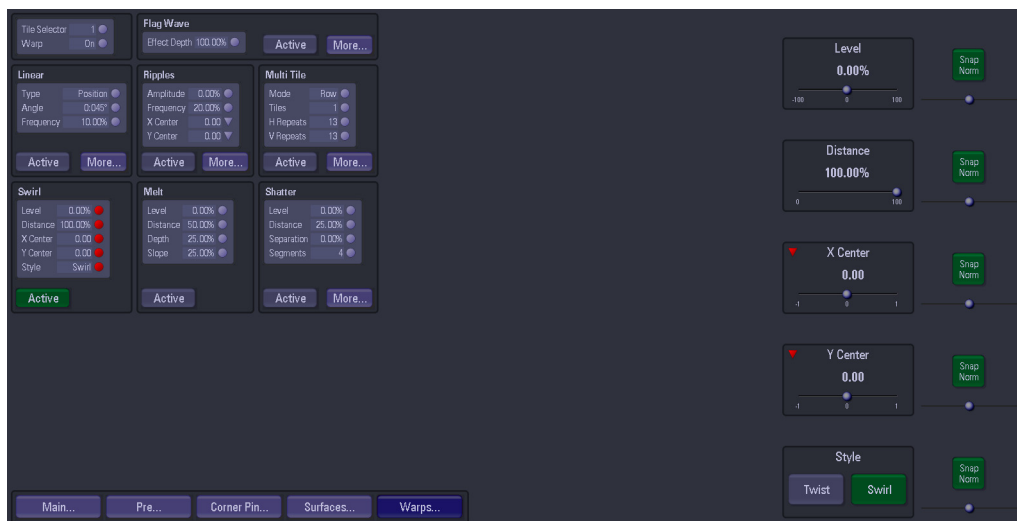
Level - controls the amount of swirl

Distance - sets how far the Swirl spreads outwards from its center

X Center - moves the center of the swirl right or left

Y Center - moves the center of the swirl up or down
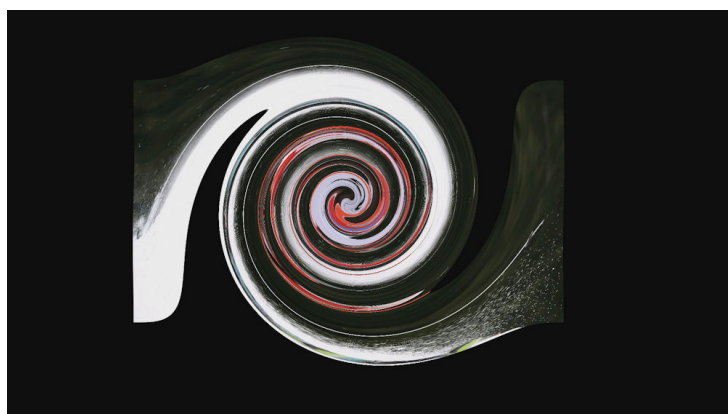
Melt

The warp Melt option gives the effect that the DVE tile is melting.
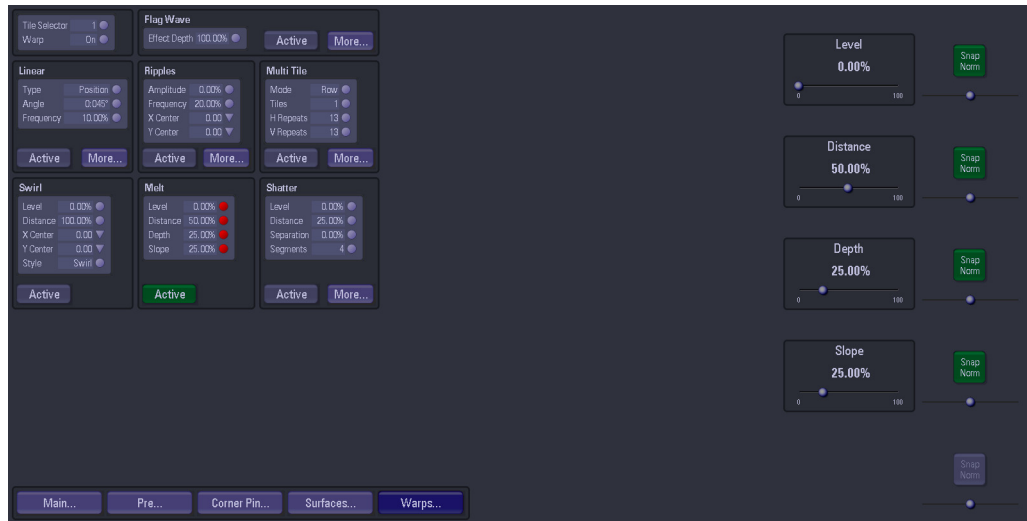
Level - sets the amount of Melt applied to the Tile

Distance - sets how far the Melt spreads away from the top of the tile

Depth - sets the depth for the bottom of the U shape between each melted segment.

Slope - determines whether the Melt will hold a straight line from the top of the screen or if it will gradually slope down the screen from the left as the percentage of the parameter is increased.
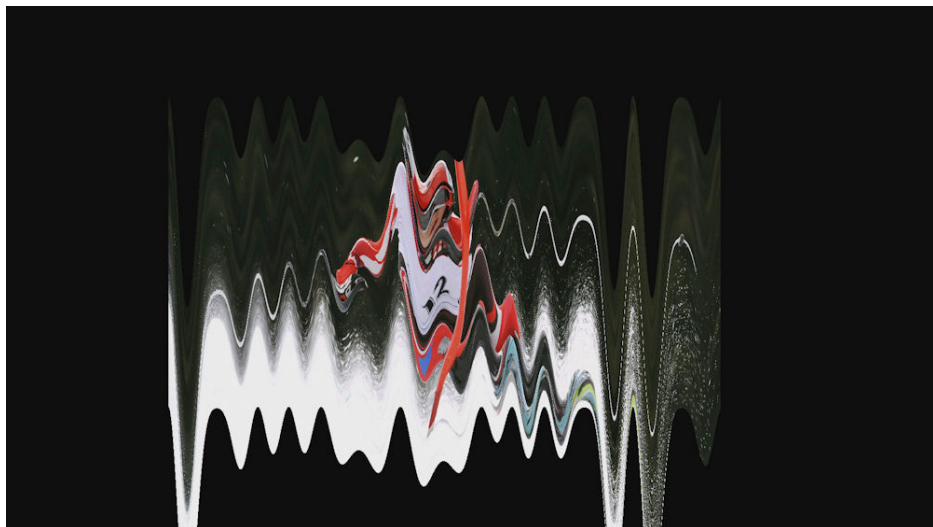
Shatter

The Shatter option, as the name suggests, gives the effect that the DVE tile being shattered like a pane of glass.
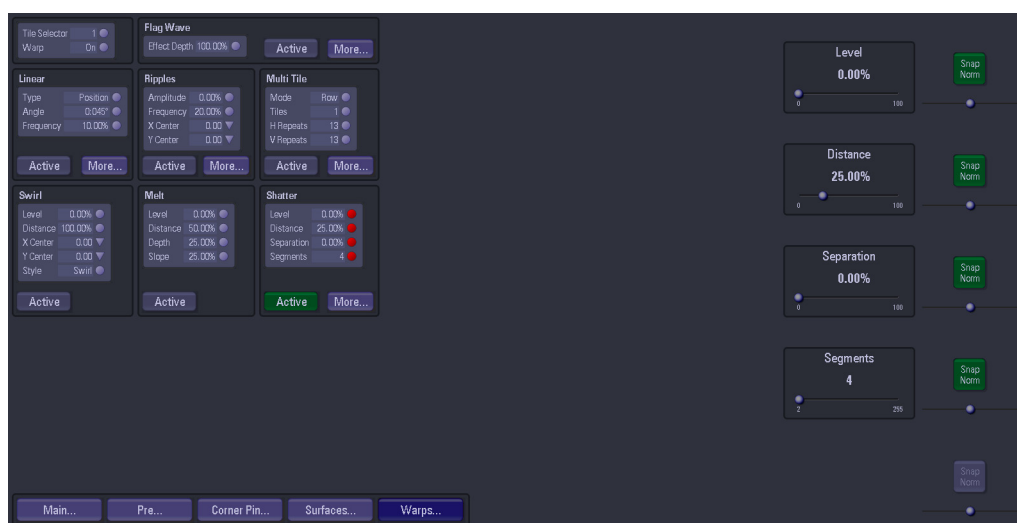
Level - controls the level of the shatter from no shatter to entirely shattered into the pre-determined number of segments and to the pre-determined distance

Distance - sets how far the Shatter spread outwards from its center

Spiral - adjusts the intensity of the spiral shape of the Shatter

Rotation - adjusts the direction of rotation of the Shatter as it spreads outwards

Segments - selects the amount of pieces the Shatter splits into.

Default Shatter Effect
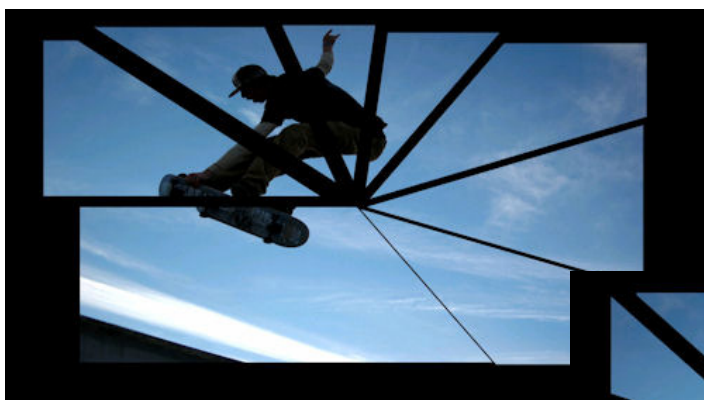
Shatter Effect with X Center adjustment
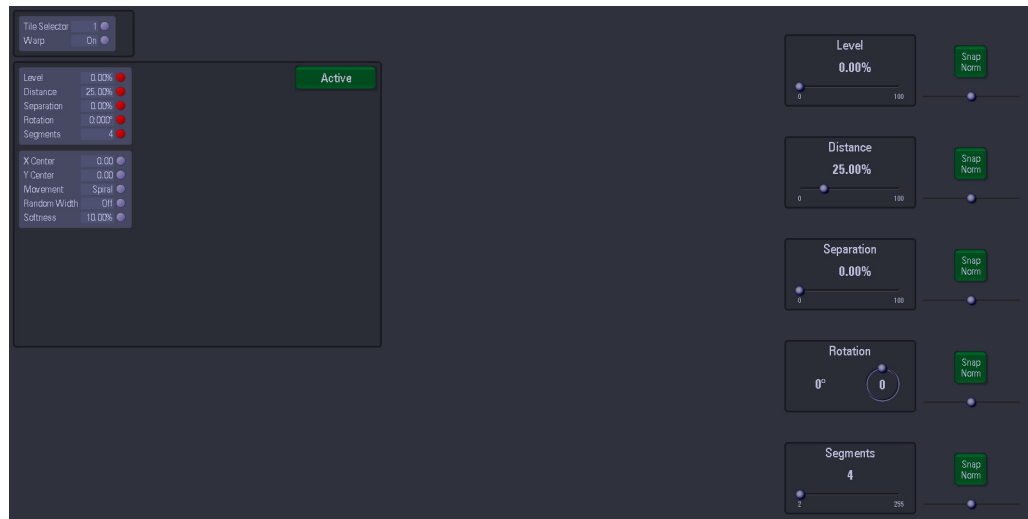
X Center - moves the Shatter center left or right

Y Center - moves the Shatter center up or down

Movement - draws segments from the center, in a non concentric pattern

Random Width - each segment of the shatter is a different size.

Softness - adjusts the softness of the edges of the shattered pieces

DVE Active Models

Before using DVE Models, make sure that the **Tiles "Active Individual Tiles"** are deselected.

DVE Slab Model

The Slab Model is made up of 3 Tiles, which make up the front 3 visible sides. When the user wants to create a slab, the first thing to make sure of is that the selected DVE has enough tiles allocated to it. As can be seen in the menu below, DVE 1 has 4 Tiles allocated, when the user presses the **{Slab}** button, the software will automatically assign 3 tiles (Tiles 2, 3 and 4 in the menu below) to the model.

> Note: Notice that in the menu below there is a Slab (6Tile) this model has the same setup and parameter controls as the 3 Tile Slab with the exception that when the slab is exploded using the **Gap** parameter, the inner sides of the three hidden tiles can be seen.
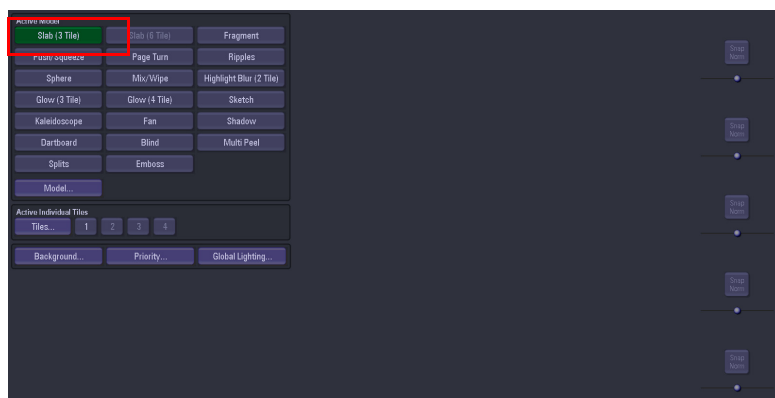
Example of a Slab Model
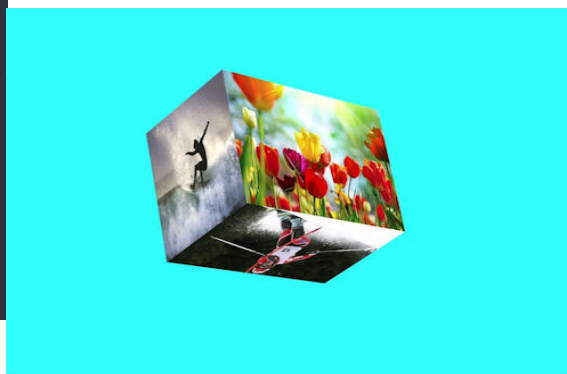
Press the **{Model...}** button to enter the parameter controls menu for the Slab Model.
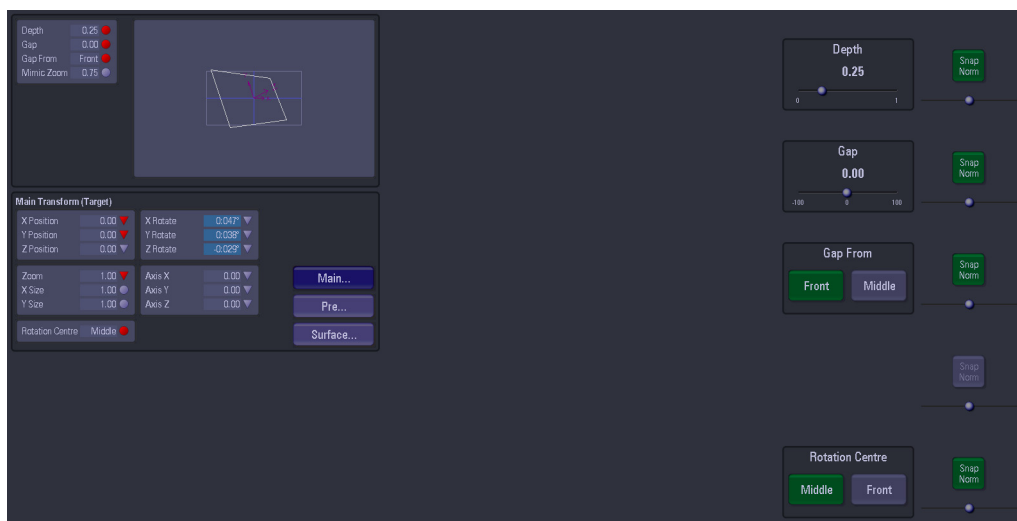
This menu is the **Main Transform (Target)** menu, which moves the slab model "Globally" around a central point, the slab can be moved away from the central point but will always move around that point, think of it as the Earth being the Slab moving around the Sun, the slab can be moved away but will always move around the central point in space by the parameter controls.

Slab Adjustment

The **Depth** adjustment will adjust the slab from being a thin sliver to a wide slab.
The **Gap** adjustment as shown below moves the 3 tiles away from each other.
Mimic Zoom - will zoom the mimic in the menu in or out.

Example of a Slab Model with Gap Adjustment
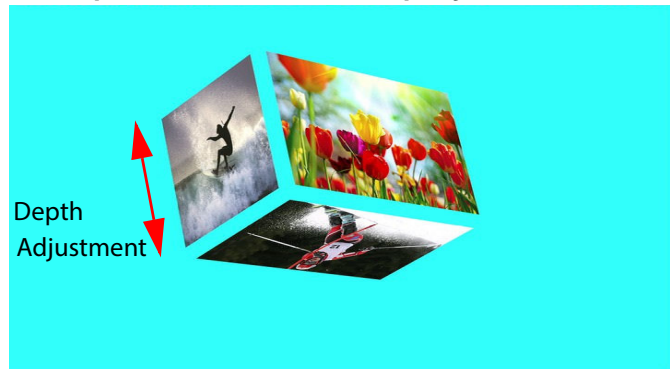
Main Transform (Target)
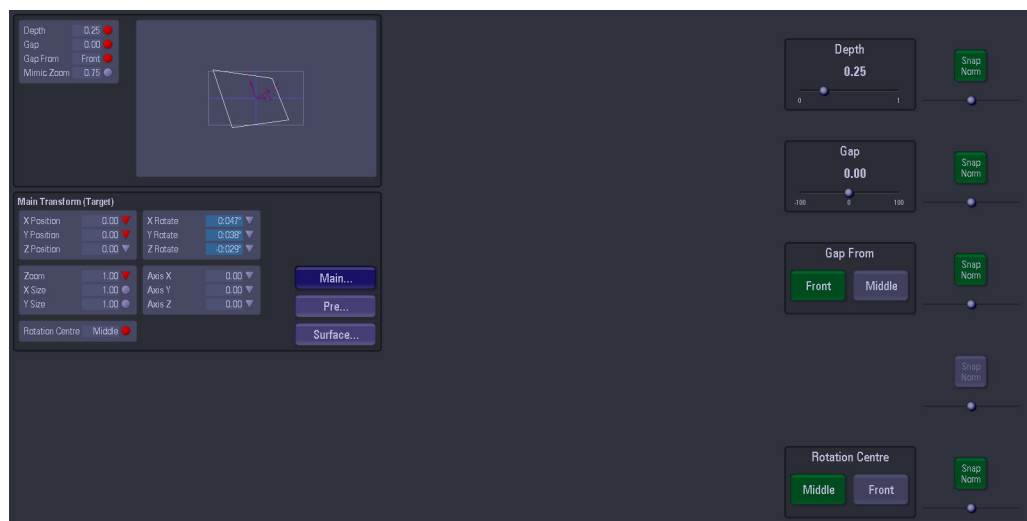
X, Y, Z Position - will move the position of the slab around the center of the axis

Zoom - will zoom the slab up or down

X, Y Size - will change the physical shape of the slab horizontally or vertically

X Rotate - rotates the slab such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

The slab model is able to switch rotation options using the Rotation Center parameter, the model can rotate around Middle or Face.

DVE Model Slab - Pre Transform (Source)

This menu is the **Pre Transform (Source)** menu, which moves the selected Slab "Locally" around its own central point, the slab can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the slab, spinning around its own axis but can be moved away from the Sun, by the parameter controls.
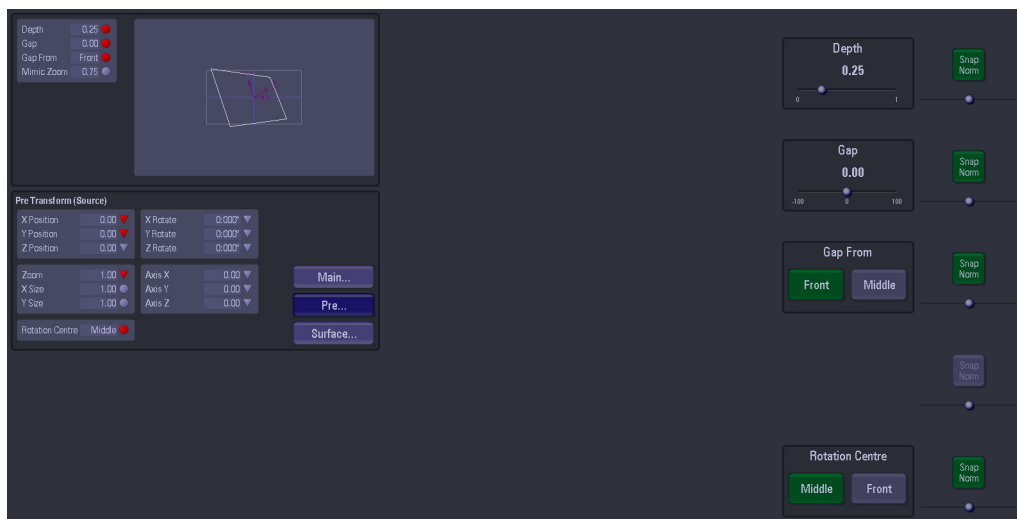
This menu has all the same adjustments as the **Main Transform (Target)** parameters.

DVE Model Slab - Surface
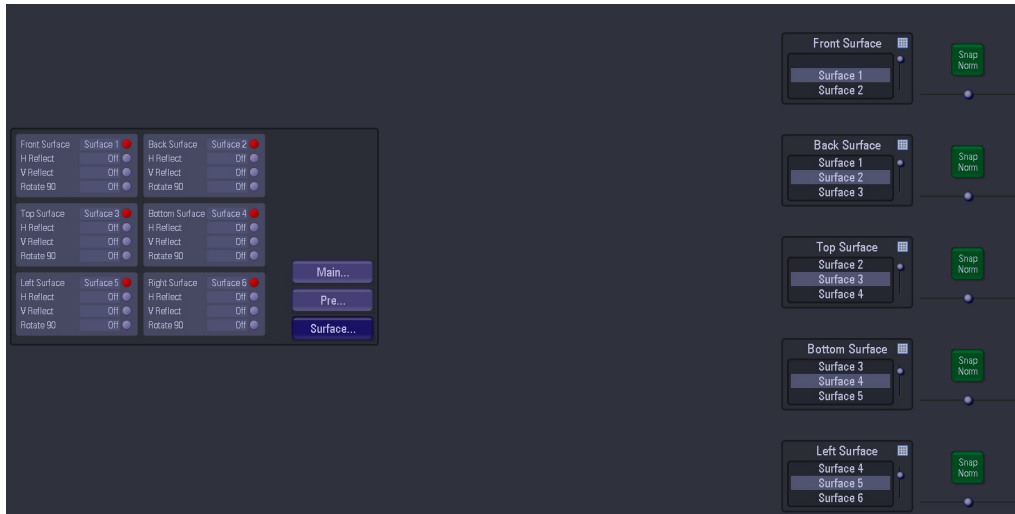
Front Surface/Back Top/Bottom Right/Left Surface - determines the surface of the selected Tile.

Front/Back H/V Reflect - the source on the front and/or back of the surface may be reflected in the horizontal or vertical direction, this maybe useful when rotating a tile to have the front and rear source in the same orientation.

Rotate - this will rotate the surface by 90°

> Note: The Reflects and Rotates are based on the original Picture Content (i.e. even after a 90 Rotate the H Reflect will reflect in the original plane of the picture)

DVE Fragment Model

The Fragment Model is made up of 2 Tiles. When the user wants to use Fragment, the first thing to make sure of is that the selected DVE has enough tiles allocated to it. As can be seen in the menu below, DVE 1 has 4 Tiles allocated to the DVE, when the user presses the **{Fragment}** button, the software will automatically assign 2 tiles (Tiles 3 and 4 in the menu below) to the model.
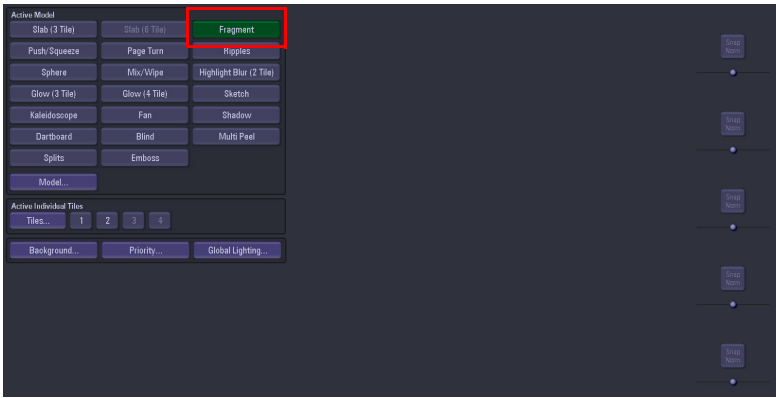

Example of a Fragment Model

Press the **{Model...}** button to enter the parameter controls menu for the Fragment Model. The parameters highlighted in the menu below control the fragmentation of the DVE Tile.
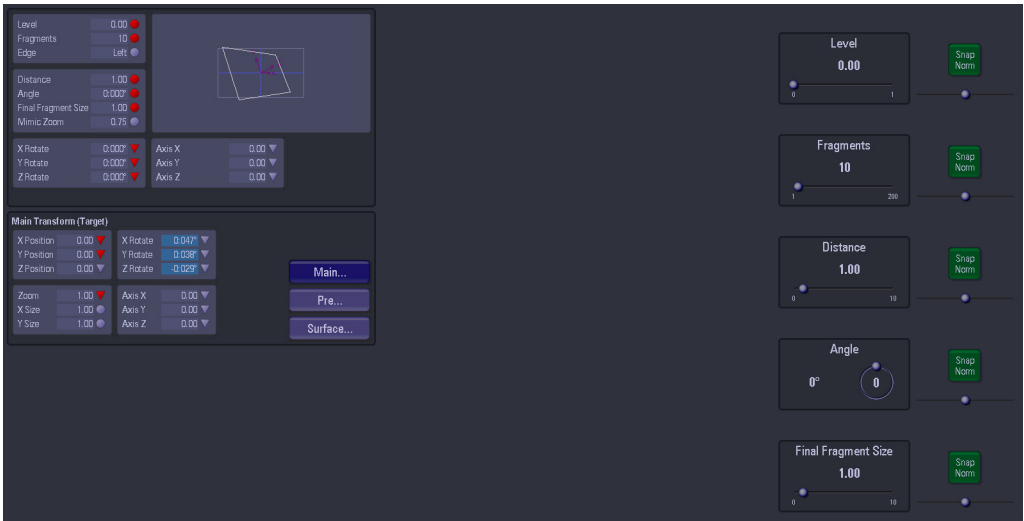
What does Fragment do?

As the fragments start to fly off the tile, the main tile will be the front surface of Tile 3 and the fragment flying off will be the front surface of Tile 3.
The tile or the fragment can be X Rotated to reveal the back of the tile, the back surface is the front surface of Tile 4 and the fragment flying off is the back surface of Tile 4.

Fragment Adjustment

Level - determines the where the fragment is in a transition, i.e. 0% is the start of the fragment, 50% is half way through the fragment and 100% the source is no longer visible.

Fragments - sets the number of slices into which the surface will be fragmented

Edge - selects the edge, (top, bottom, left or right) from which the slice will occur

Distance - determines how far the slice will fly across the screen before it vanishes and a new slice starts

Angle - the angle at which the fragmented section will travel as it disappears.

Final Fragment Size - determines the size of the fragment before it disappears and another fragment starts

X,Y,Z Rotate - determine the angle and direction a fragmented section will travel in as it is torn away
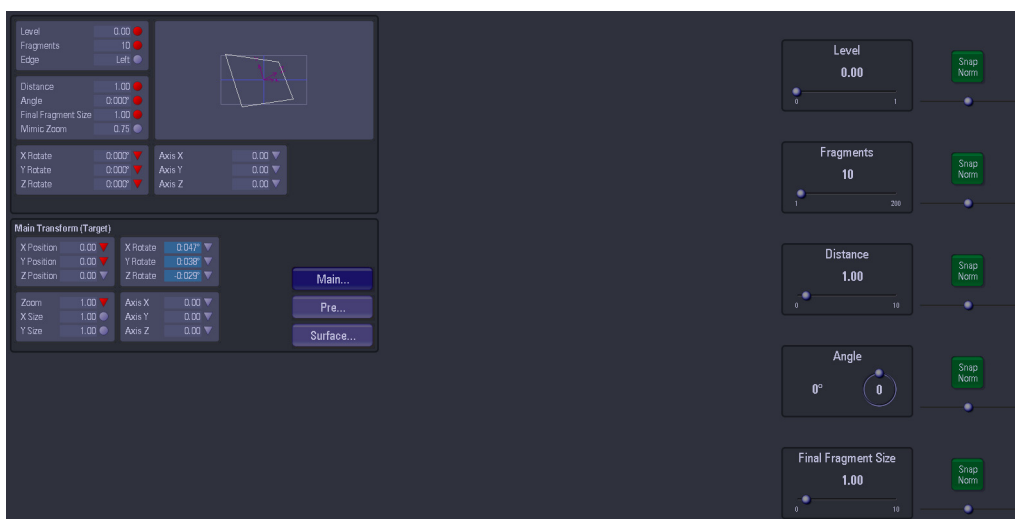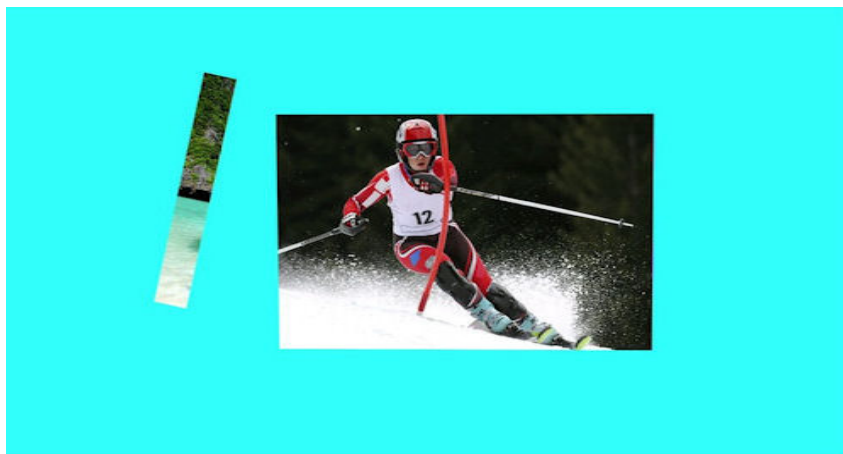
Main Transform (Target)

The **Main Transform (Target)** parameters, moves the whole Tile "Globally" around a central point, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the fragment tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the slab around the center of the axis

Zoom - will zoom the slab up or down

X, Y Size - will change the physical shape of the slab horizontally or vertically

X Rotate - rotates the slab such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

DVE Model Fragment - Pre Transform (Source)

This menu is the **Pre Transform (Source)** menu, which moves the selected Fragment model "Locally" around its own central point, the fragment tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the fragment tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.
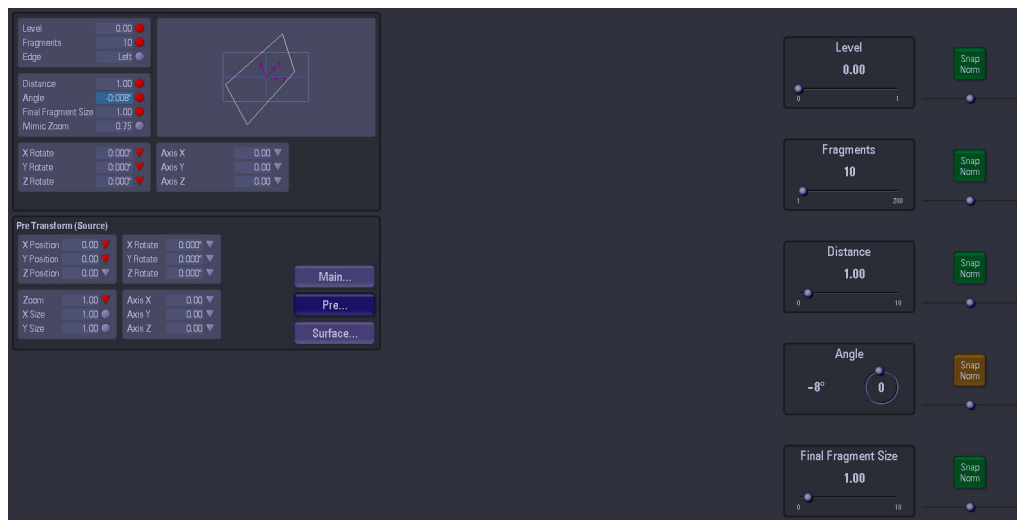
This menu has all the same adjustments as the **Main Transform (Target)** parameters.

DVE Model Fragment - Surface
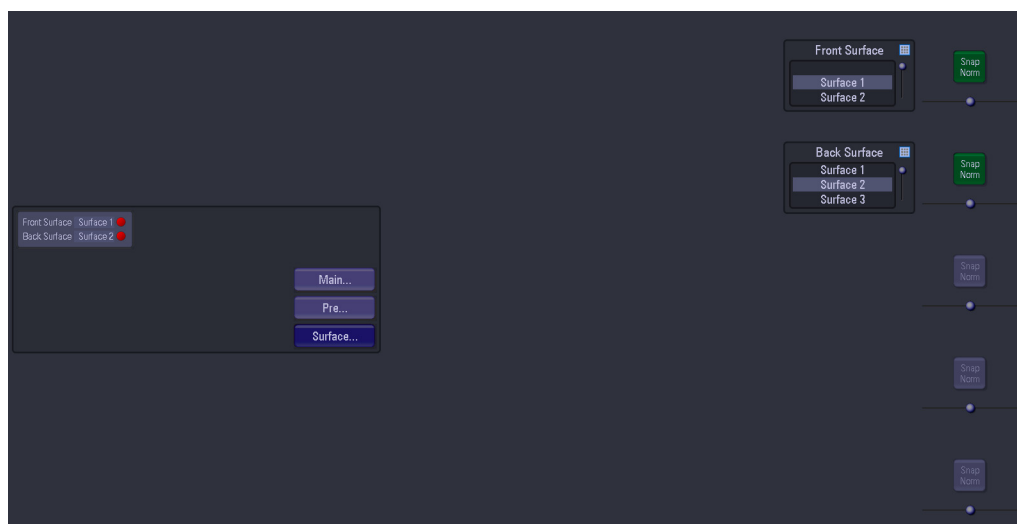
Front Surface/Back Surface - determines the surface of the selected Tile.

DVE Push/Squeeze Model

The Push/Squeeze Model is made up of 2 Tiles. When the user wants to use push/squeeze, the first thing to make sure of is that the selected DVE has enough tiles allocated to it. As can be seen in the menu below, DVE 1 has 4 Tiles allocated, when the user presses the **{Push/Squeeze}** button, the software will automatically assign 2 tiles (Tiles 3 and 4 in the menu below) to the model.
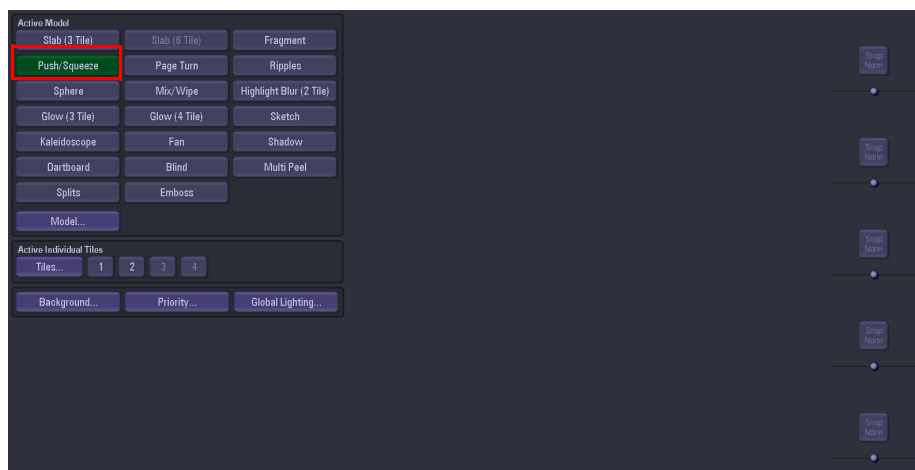

Example of a Push Model

Example of a Squeeze Model

Press the **{Model...}** button to enter the parameter controls menu for the Push/Squeeze Model.
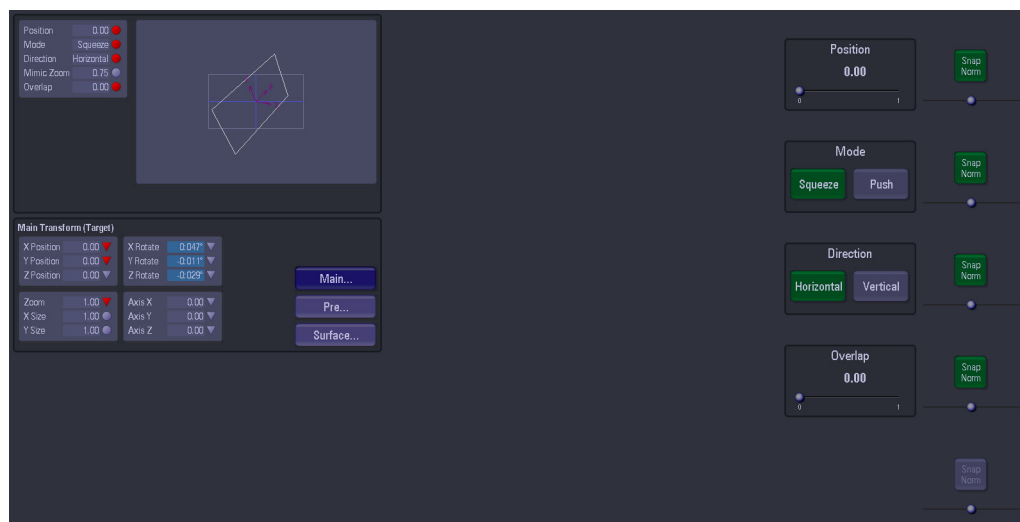
This menu is the **Main Transform (Target)** menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

What does Push/Squeeze do?

The main tile will be the front surface of Tile 3 and as the push starts from left to right, the back surface of Tile 3 will push the front surface of Tile 3 away.
When the tile is X Rotated to reveal the back of the tile, the main tile will be the front surface of Tile 4 and as the squeeze starts from left to right, the back surface of Tile 4 will squeeze the front surface of Tile 4 away.

Push Squeeze Adjustment

Position - determines the position (amount) of push or squeeze applied to a tile.
Push/Squeeze - switches between the Push and Squeeze models
Up/Down - determines whether the push or squeeze happens from left to right or top to bottom.
Mimic Zoom - will zoom the mimic in the menu in or out.
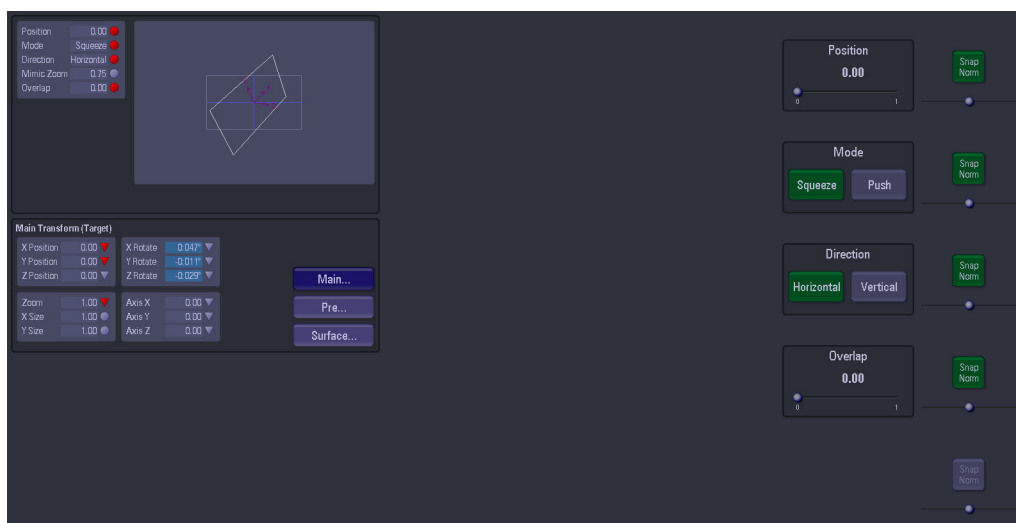
Main Transform (Target)

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

**X Rotate** - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

DVE Model Push/Squeeze - Pre Transform (Source)

This menu is the **Pre Transform (Source)** menu, which moves the selected Push/Squeeze model "Locally" around its own central point, the push/squeeze tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.
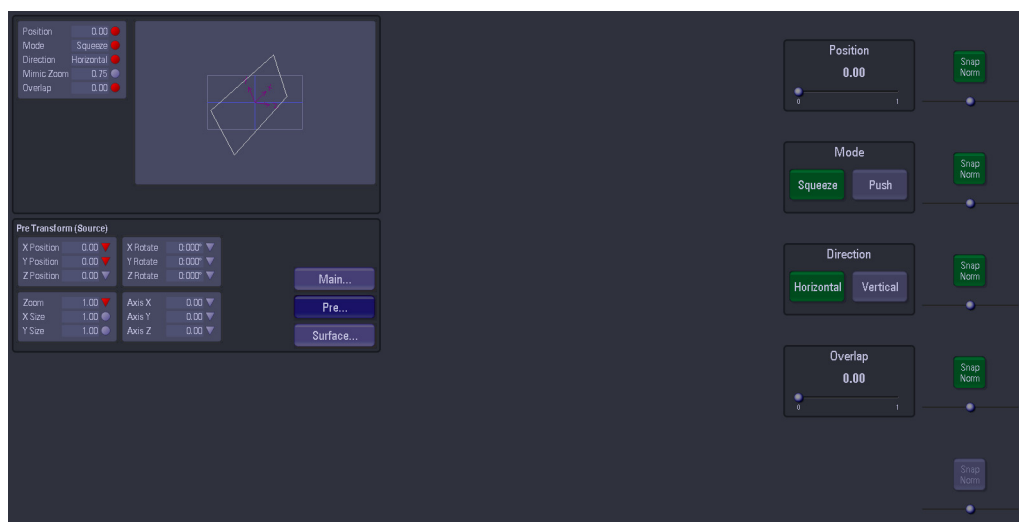
This menu has all the same adjustments as the **Main Transform (Target)** parameters.

DVE Model Push/Squeeze - Surface
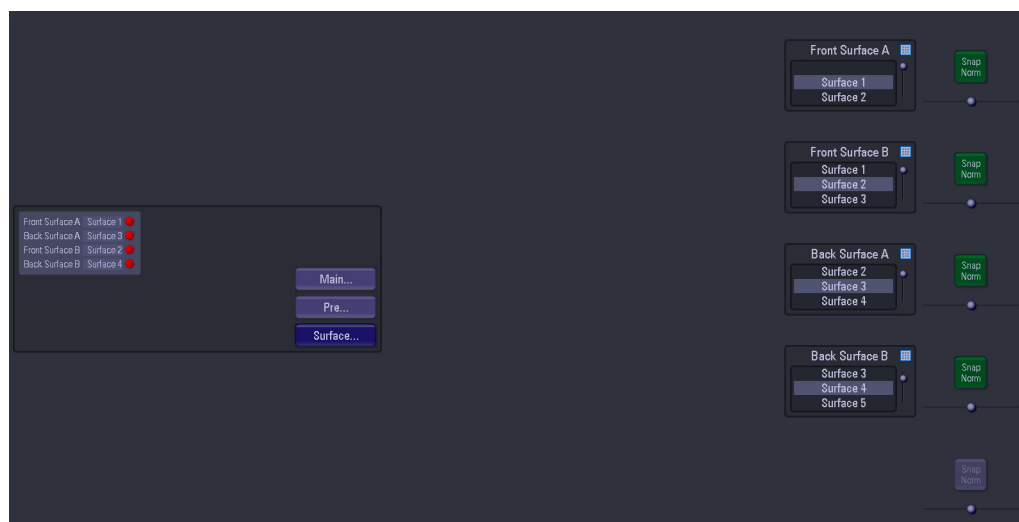
Front Surface A/B /Back A/B Surface - determines the surface of the selected Tile.

Front/Back H/V Reflect - the source on the front and/or back of the surface may be reflected in the horizontal or vertical direction, this maybe useful when rotating a tile to have the front and rear source in the same orientation.

Rotate - this will rotate the surface by 90°

> Note: The Reflects and Rotates are based on the original Picture Content (i.e. even after a 90 Rotate the H Reflect will reflect in the original plane of the picture)

DVE Page Turn Model

The Page Turn Model as the name suggests simulates a page being turned over in a book, the model is made up of 2 surfaces, one surface being the front, the other being the back of the page being turned over. When the user wants to use page turn, the first thing to make sure of is that the selected DVE has enough tiles allocated to it. As can be seen in the menu below, DVE 1 has 4 Tiles allocated, when the user presses the **{Page Turn}** button, the software will automatically assign 2 tiles (Tiles 3 and 4 in the menu below) to the model.
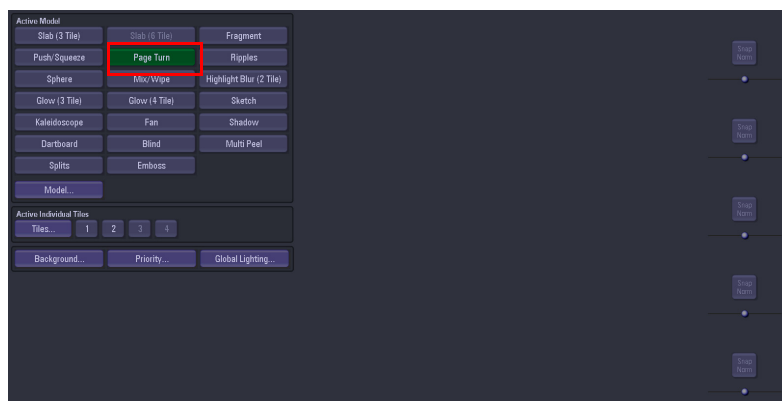
Example of Source Based Page Turn
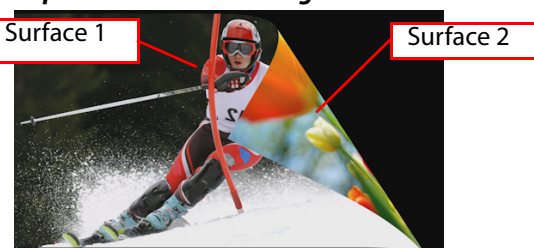
Surface 1   Surface 2

Example Bus Based Keyed over Bgnd

Press the **{Model...}** button to enter the parameter controls menu for the Page Turn Model.

What does Page Turn do?

The front surface of the page is Tile 3 and as the **Position** parameter is adjusted, by default the page will start to turn over from the top right corner. As the page starts to turn the rear of the page; Tile 4 will be reveled.
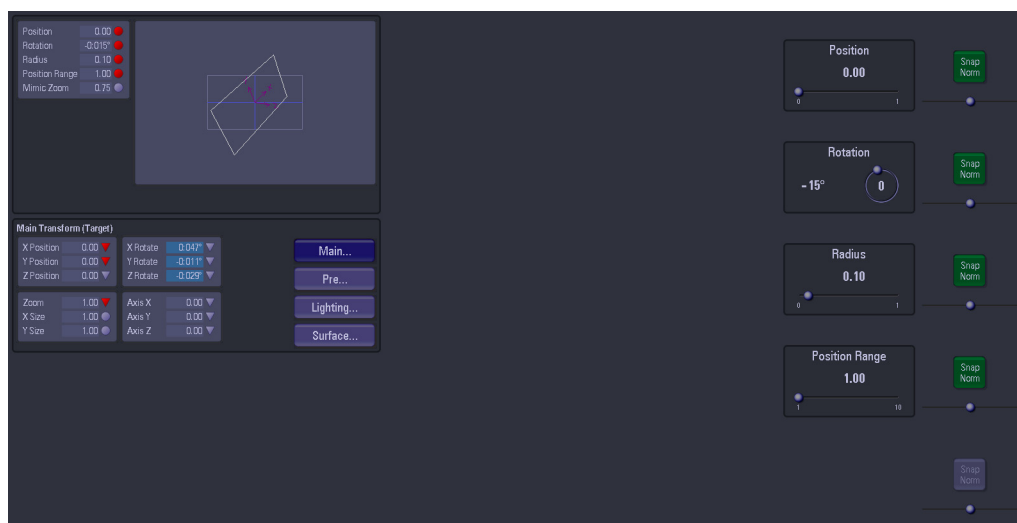
Page Turn Adjustment

Position - controls the level of the Turn. 0% = no turn, 100% = fully turned

Rotation - changes the angle from which the Page Turn starts

Radius - changes the tightness of the turn in the page

Position Range - changes the point at which the Page Turn fully completes

Mimic Zoom - will zoom the mimic in the menu in or out.

Main Transform (Target)

This menu is the **Main Transform (Target)** menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

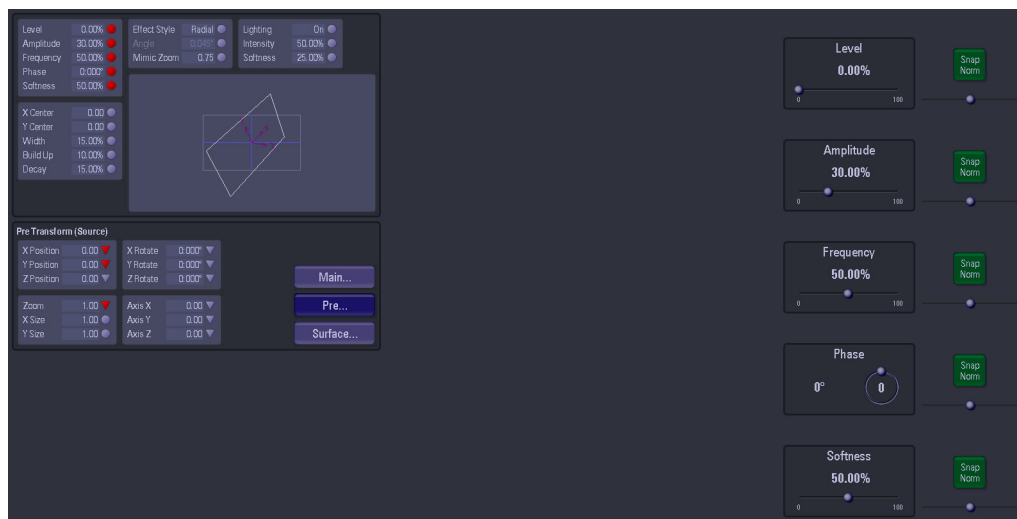**X Rotate** - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise
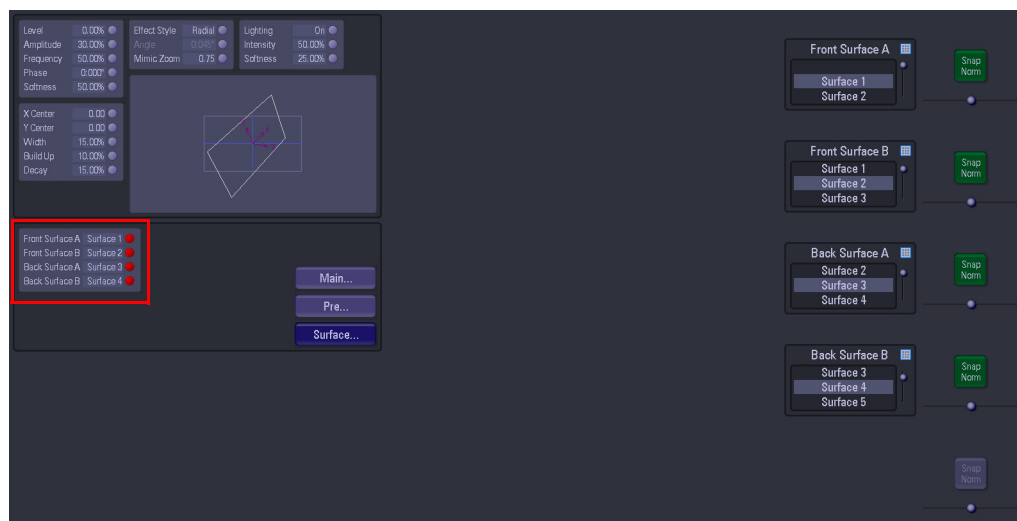
Axis X, Y, Z - moves the central axis point around

DVE Model Page Turn - Pre Transform (Source)

This menu is the **Pre Transform (Source)** menu, which moves the selected Page Turn model
"Locally" around its own central point, the tile can be moved away from the Main Transform
(Target) central point but will always move around its own axis, again, think of it as the Earth
being the push/squeeze tile, spinning around its own axis but can be moved away from the
Sun, by the parameter controls.
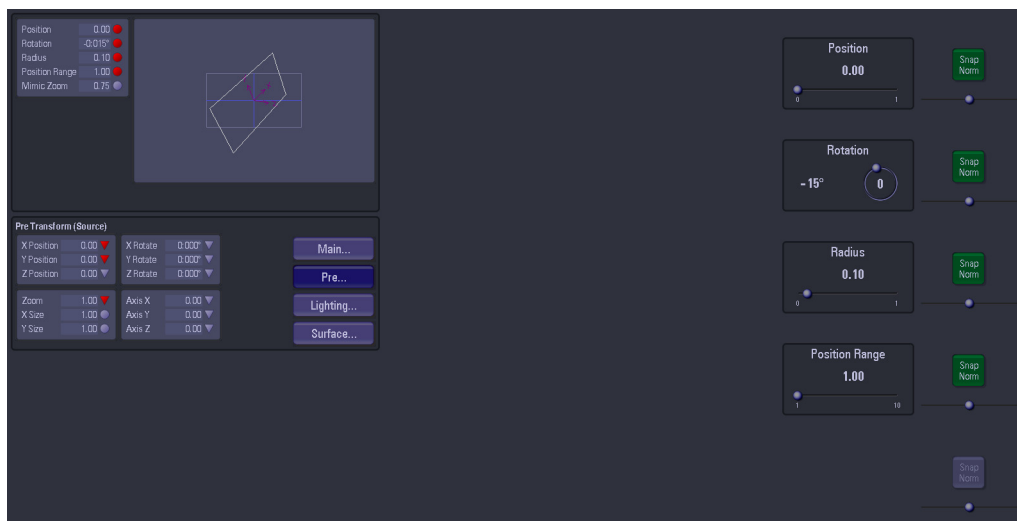
This menu has all the same adjustments as the **Main Transform (Target)** parameters.

Lighting

To help distinguish between the three different types of lighting please refer to the diagram below.

1. **Highlight** - light hitting the curve of the page turn.

2**. Inner Shadow** - shadow falling from the inside curve of the page turn.

3**. Outer Shadow** - shadow falling from the outside of the curve onto the background source.

The following parameters are the same for the three types of lighting source.

Intensity - intensity of the light/shadow source

Width - adjusts the width of the light/shadow source

Softness - adjusts the softness of the edge of the light/shadow

Position - adjusts the angle where the light/shadow source fall on the page turn.
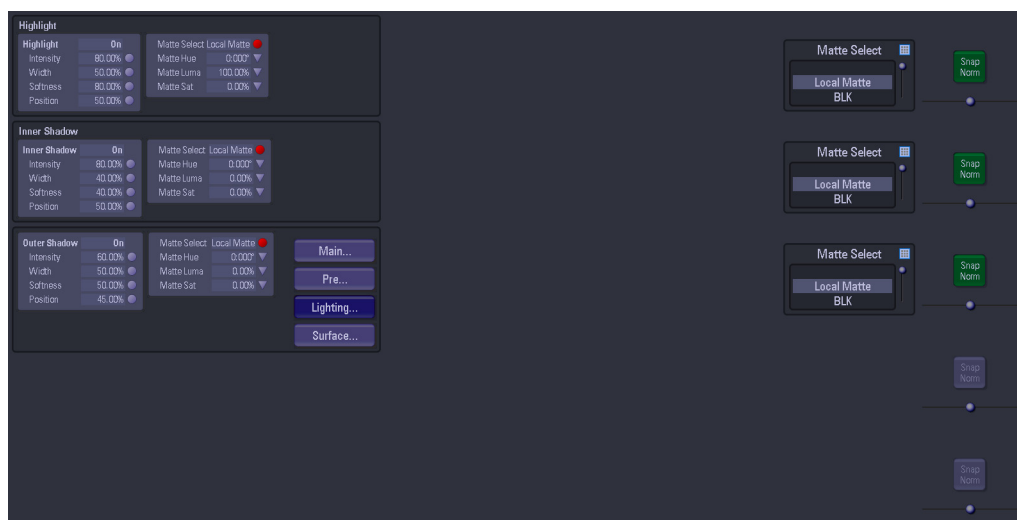
DVE Model Page Turn- Surface
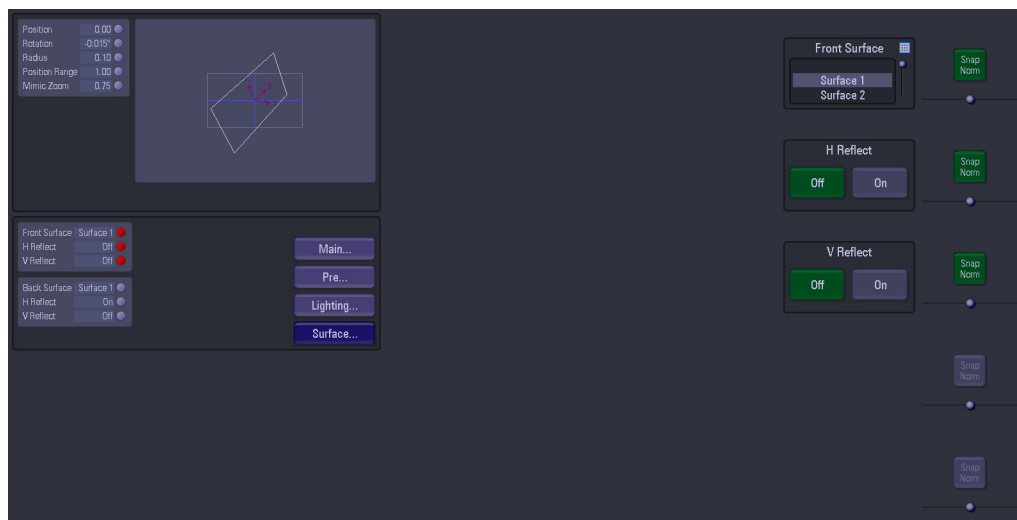
Front Surface/Back Surface - determines the surface of the selected Tile.

Front/Back H/V Reflect - the source on the front and/or back of the surface may be reflected in the horizontal or vertical direction, this maybe useful when rotating a tile to have the front and rear source in the same orientation.

Ripples

The Ripples Model as the name suggests simulates ripples on a pond, the model is made up of 4 surfaces, Front A/B and Back A/B. When the user wants to use Ripples, the first thing to make sure of is that the selected DVE has enough tiles allocated. As can be seen in the menu below, DVE 4 has 4 Tiles allocated, when the user presses the **{Page Turn}** button, the software will automatically assign 2 tiles (Tiles 1 and 2 in the menu below) to the model.
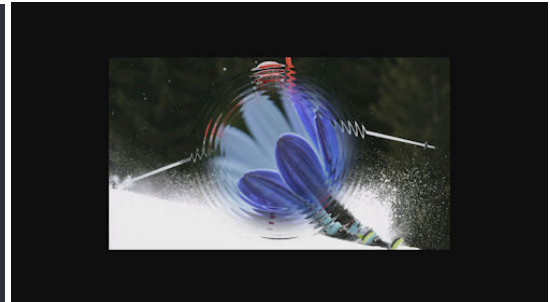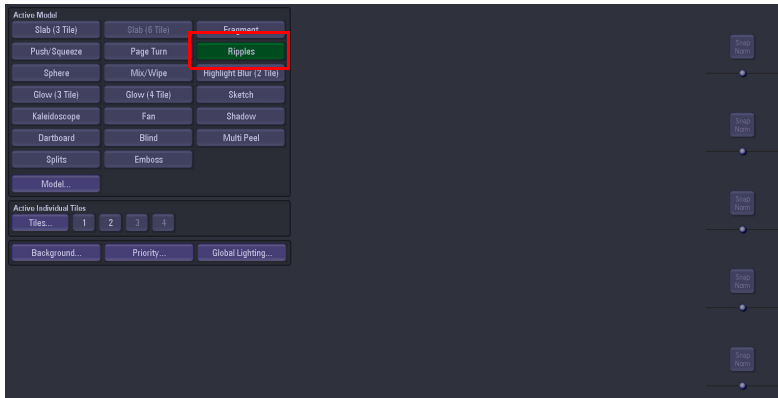
Ripples Front Surface A/B
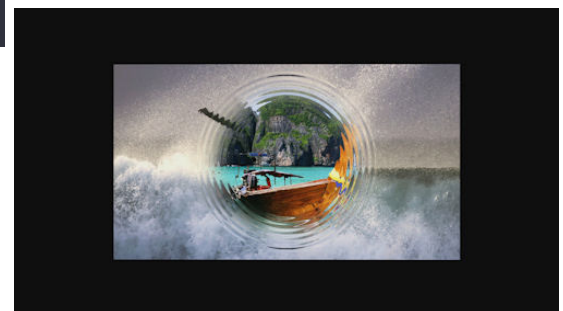
Ripples Back Surface A/B
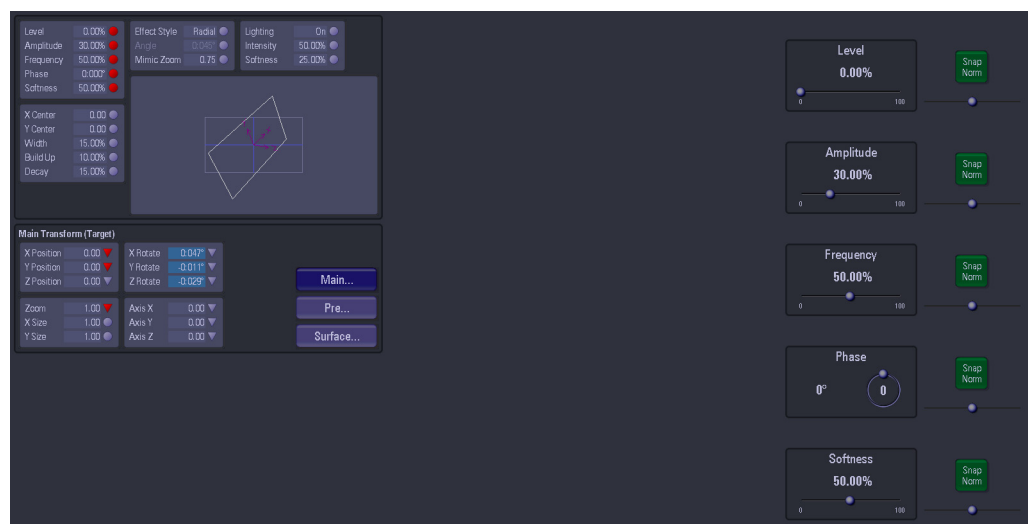
Level - applies the Ripple effect to a tile.

Amplitude - controls the intensity of the 'Shape cycle', the larger the amplitude the more dramatic the Ripple

Frequency - determines how often the Ripple is applied to the tile

Phase - adjusts the warp starting point within the 'Shape cycle'

Softness - adds a soft edge to the ripple effect, starting from the inside and working its way out as softness is adjusted.

Radial - keeps a constant radial affect to the ripples

Angled - allows the angle of shadow across the ripples to be adjusted

Mimic Zoom - zooms in or out the tile mimic in the menu

X Center - moves the Ripple center left or right

Y Center - moves the Ripple center up or down

Width - sets the width between the Ripples, as width is adjusted up, the parameter will add more ripples, or take the ripples away completely if set to 0%.

Build Up - applies a softness between the outside ripple and the rest of tile

Decay - applies a softness from the center of the ripple outwards

Ripples with Width parameter turned up

Main Transform (Target)

This menu is the **Main Transform (Target)** menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

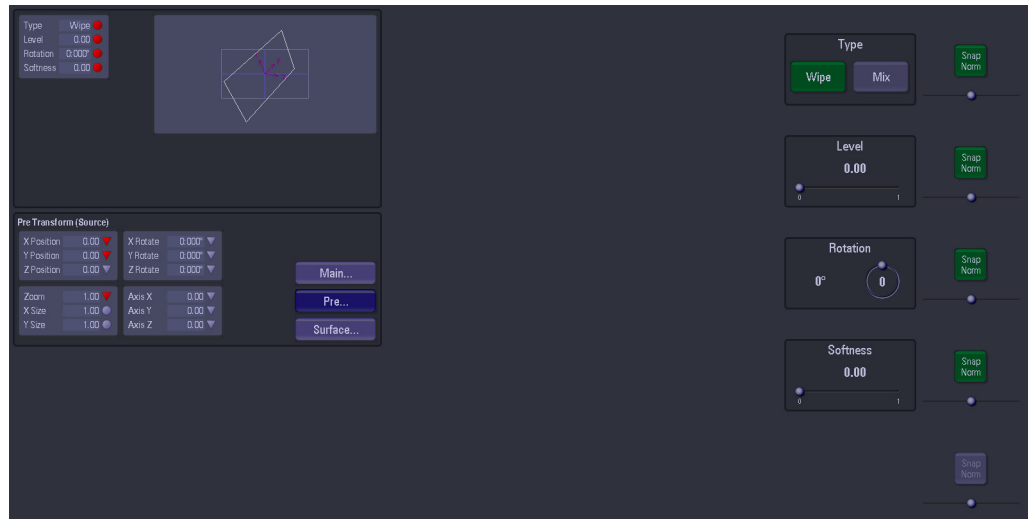**X Rotate** - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around
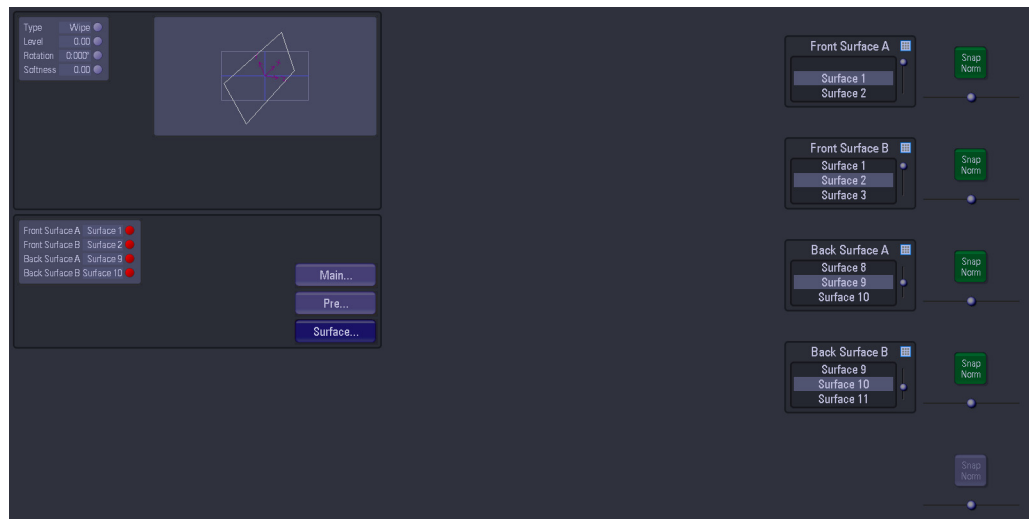
DVE Model Ripples - Pre Transform (Source)

This menu is the **Pre Transform (Source)** menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the **Main Transform (Target)** parameters.

Surface parameters

Front Surface A/B - selects the source for surface A and B

**Back Surface A/B** - selects the source for surface A and B.

Sphere Model

This DVE option allows the user to create a Sphere from a DVE Tile.
The Sphere Model as the name suggests simulates a sphere who's shape can be manipulated, the model is made up of 2 surfaces, one surface being the front, the other being the back. When the user wants to use the sphere model, the first thing to make sure of is that the selected DVE has enough tiles allocated to it. As can be seen in the menu below, DVE 1 has 4 Tiles allocated, when the user presses the **{Sphere}** button, the software will automatically assign 2 tiles (Tiles 3 and 4 in the menu below) to the model.
Press the **{Model...}** button to start using the sphere menus.
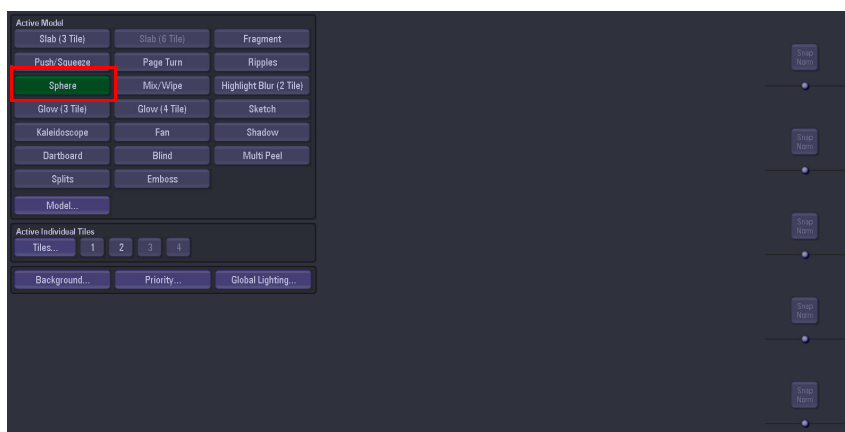
Default Sphere DVE Model
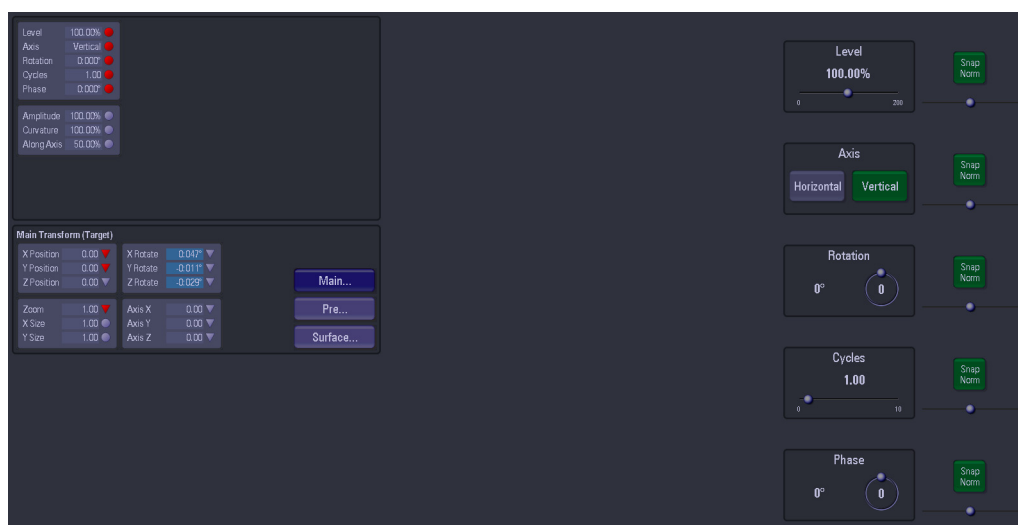
Sphere Parameters

Level - gradually makes a DVE Surface change from its original shape into a spherical shape. Default setting is at 100%. if the user adjusts the parameter towards 200%, the sphere will squash down to nothing.

Axis - displays the Sphere horizontally or vertically

Rotation - rotates the Sphere on its axis

Cycles - produces more than 1 Sphere from one source

Phase - will move the Sphere/Spheres along a horizontal/vertical axis

Amplitude - adjusts the radius of the Sphere, 0% amplitude = cylindrical 100% amplitude = fully spherical

Curvature - adjusts the bulge that is given to the spheres surface

Along Axis - length of curvature along the set axis

Surfaces Parameters
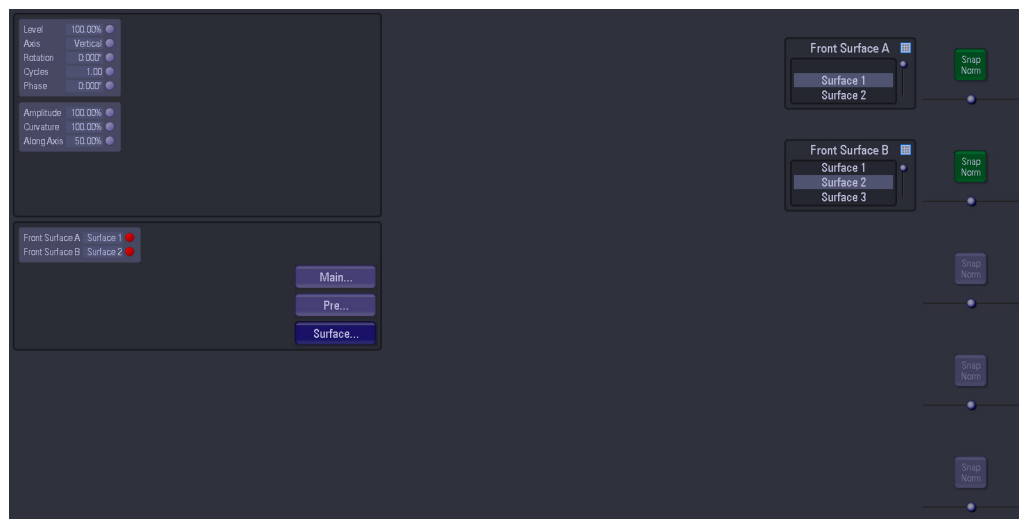
Front Surface A/B - selects the surface A and B.

Mix/Wipe Model

This DVE option will provide a Mix or Wipe option between two DVE Tile; Front or Rear surfaces.
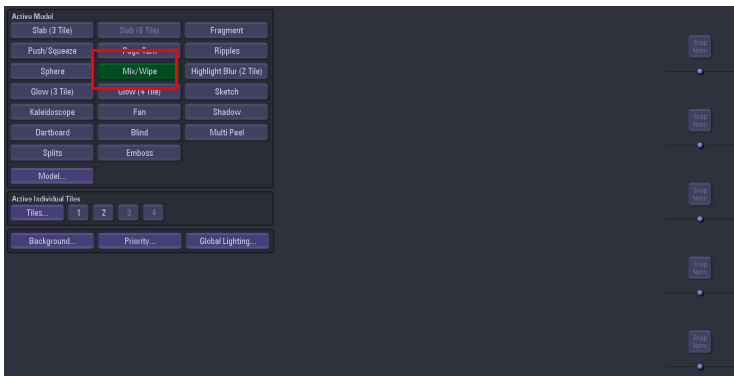
DVE Tile with Wipe
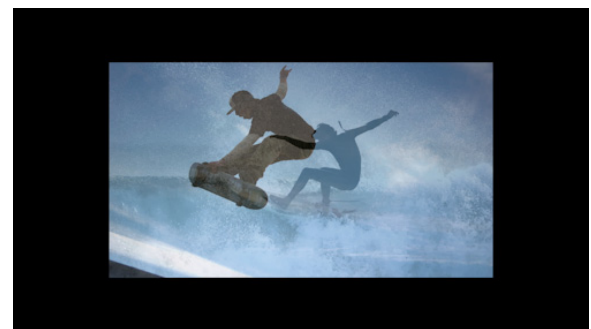
DVE Tile with Mix

Mix/Wipe Parameters
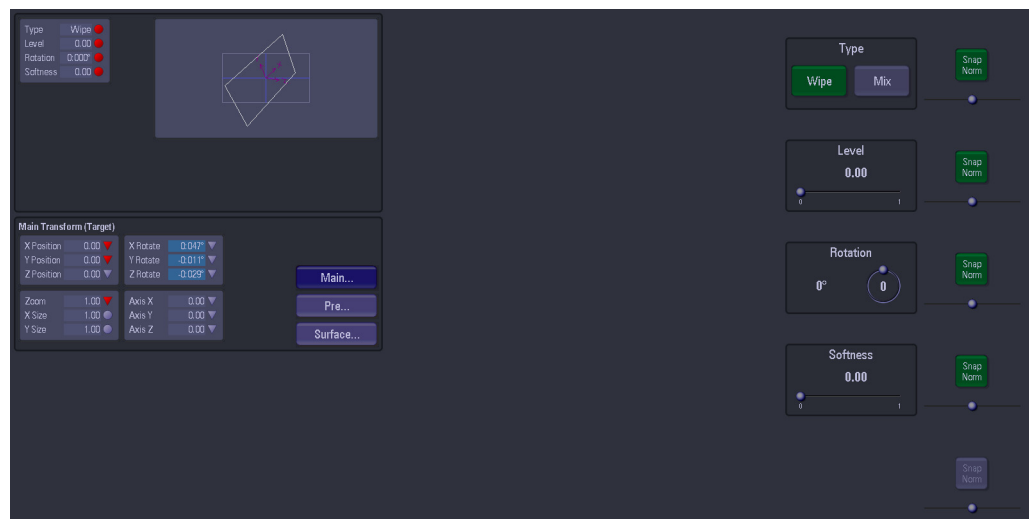
Type - selects between Mix or Wipe

Level - transition level of Mix or Wipe

Rotation - depicts the angle at which the Mix or Wipe starts

Softness - adjusts the softness of the wipe edge

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

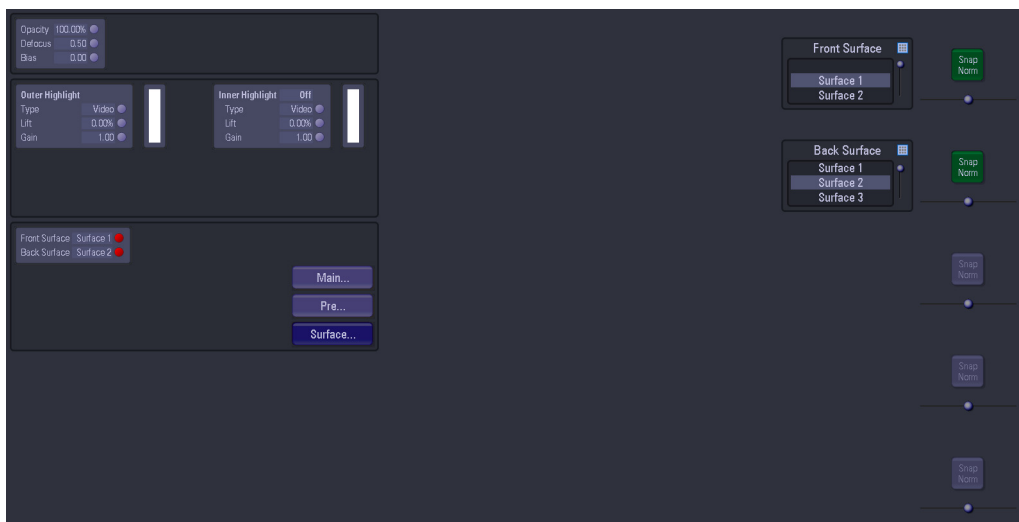**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface A/B - selects the source for surface A and B.

Back Surface A/B - selects the source for surface A and B.

Highlight Blur Model

Highlight Blur adjusts and blurs the Luma content of a DVE Tile surface.
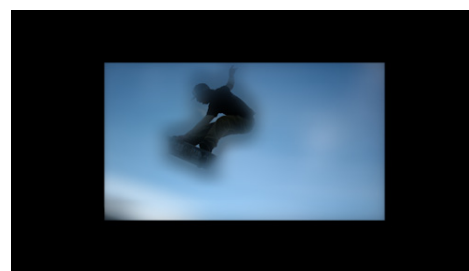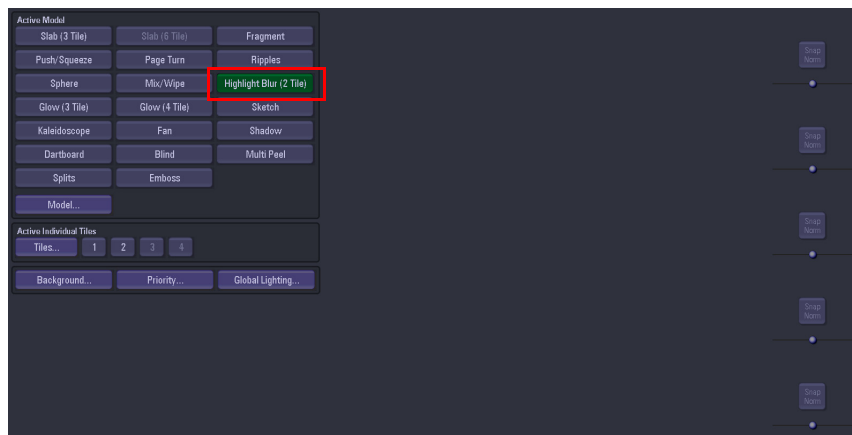
DVE Tile with Defocus and Bias and Outer Highlight adjustments

Highlight Blur Parameters
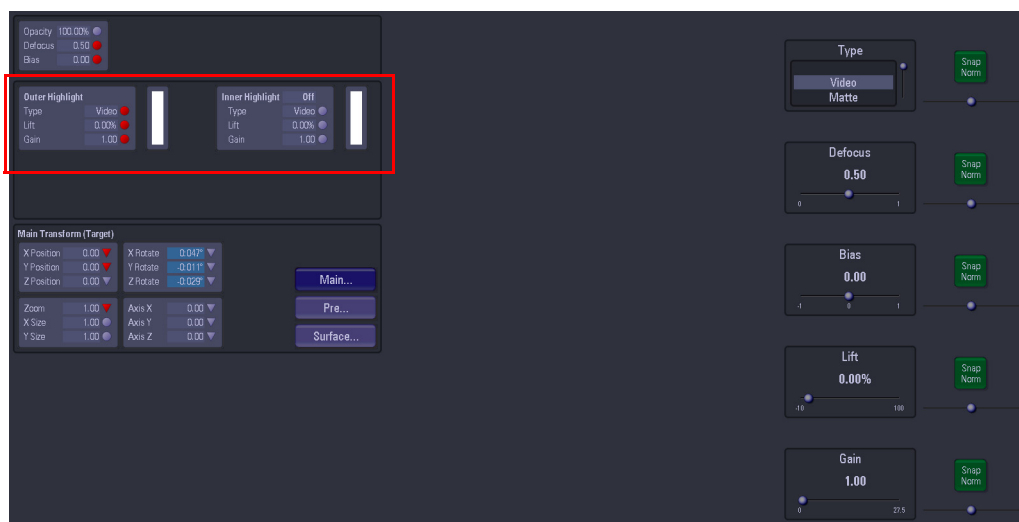
Opacity - sets the opacity level of luminance

Defocus - adjusts the amount of defocus applied to the source

Bias - this changes the horizontal and vertical blur bias

Outer and Inner Highlight

Type - will select between luminance of the source or luminance of a Matte added to the luminance of the source

Lift - makes an overall Luma adjustment to the entire image

Gain - sets the amplitude of the luminance signal

> Note: Touching the Matte color block will display a Local Matte adjustment option or preset Matte options.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface - selects the source for the tile front surface.

Back Surface - selects the source for the tile back surface.

DVE Model - Glow (3 Tile and 4 Tile Advanced)

The Glow model works in a similar fashion to the Highlight Blur Model, but the Glow adjustments can be used to draw out the dark and light areas of a DVE surface, for instance to accentuate the soft atmosphere of candlelight.
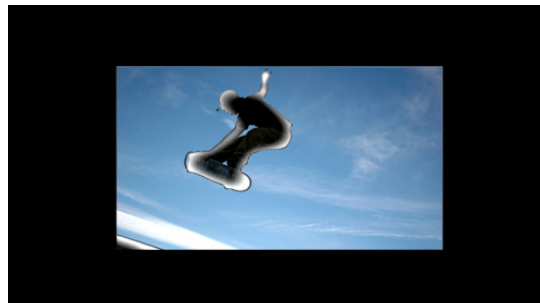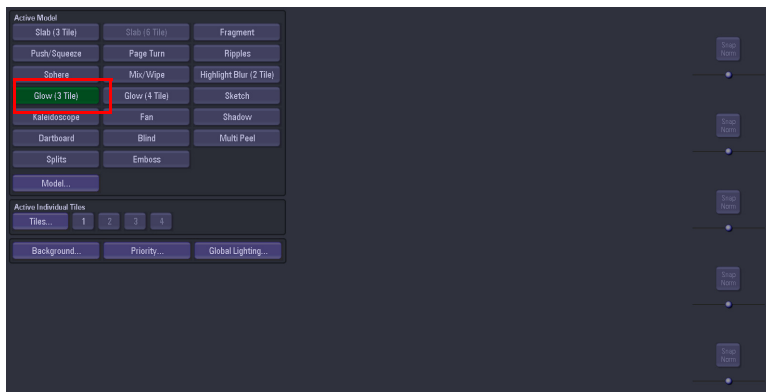
DVE Surface with Default 3 Tile Glow

DVE Surface with Inner Bias and Gain adjusted

Glow Parameters
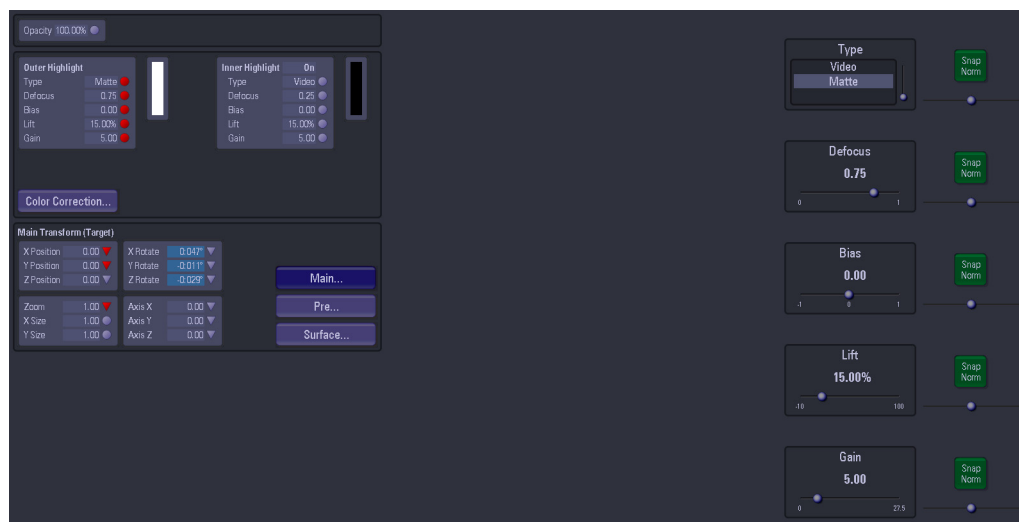
Opacity - sets the opacity level of luminance

Outer and Inner Highlight

Type - will select between luminance of the source or luminance of a Matte added to the luminance of the source

Defocus - adjusts the amount of defocus applied to the source

Bias - this changes the horizontal and vertical glow bias

Lift - sets the Luma level of the source

Gain - affects the sharpness of the source

> Note: Touching the Matte color block will display a Local Matte adjustment option or preset Matte options.

Color Correction

This allows the user to adjust the color of the Glow Effect, there are a range of adjustments and effects that can be applied.

The color correction part of the menu allows the user to change the color balance on the DVE surface.

To use the color correction options, press the **{Color Correction}** button in the main menu and the button will go Green.

DVE Model - Glow Color Correction - YUV

The basic controls of Brightness, Contrast and Saturation can now be adjusted using the parameter controls.
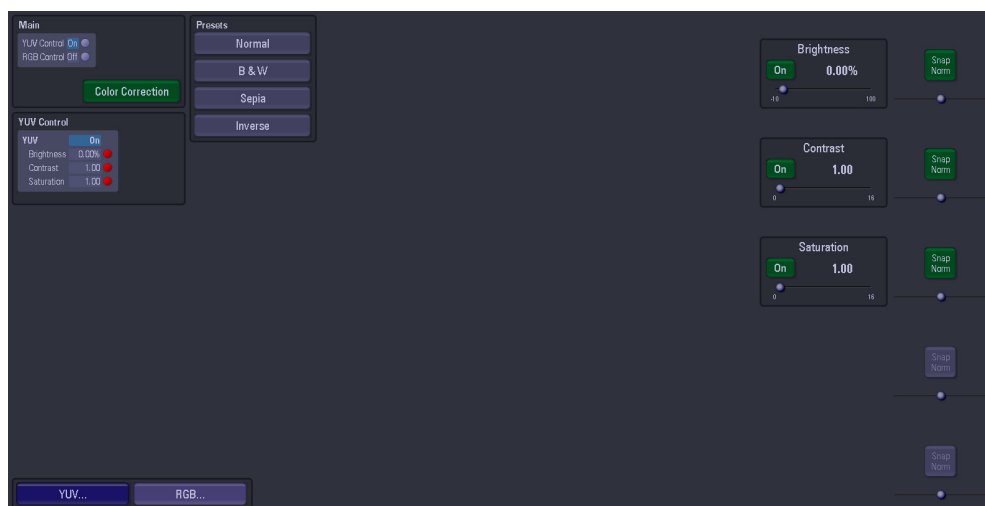
Touch the YUV Control attacher and by changing the parameters, the Brightness, Contrast and Saturation can be adjusted.

Brightness - default value is 0.00%, and the range is from -10% to 100%

Contrast - default value is 1.00%, and the range is from -0% to 16%

Saturation - default value is 1.00%, and the range is from -0% to 16%

There are also Preset color correction controls, which add a preset color level when selected.

> Note: The YUV color correction parameters do not work if the Preset is set to Normal

DVE Model - Glow Color Correction - RGB

Press the **{RGB...}** menu button to enter the DVE Surface - RGB menu.

The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time.

When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.

Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas. Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White Level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface - selects the source for the tile front surface.

Back Surface - selects the source for the tile back surface.

Glow Advanced (4 Tile Menu)

The main functions of this menu work exactly the same as the 3 Tile Glow model, but this menu introduces an "Outer Fill" option (which incorporates the 4th Tile)
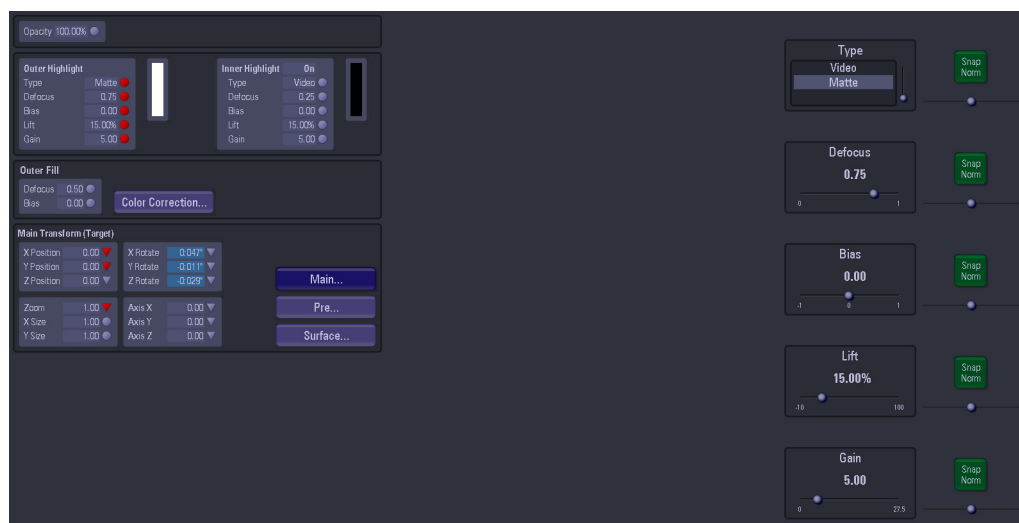
Outer Fill

These parameters allow the user to have separate Defocus and Bias controls for the 4th Tile, (the Outer Fill tile).

Surface Parameters

Background, Outer Fill, Outer Highlight and Inner Highlight

These parameters allow the user to change the sources for all 4 tiles in this Glow model.

Front Surface - selects the source for the tile front surface.

Back Surface - selects the source for the tile back surface.

DVE Model - Sketch

This DVE surface model changes a surface source to make it look as if it has been drawn with a pen or a pencil
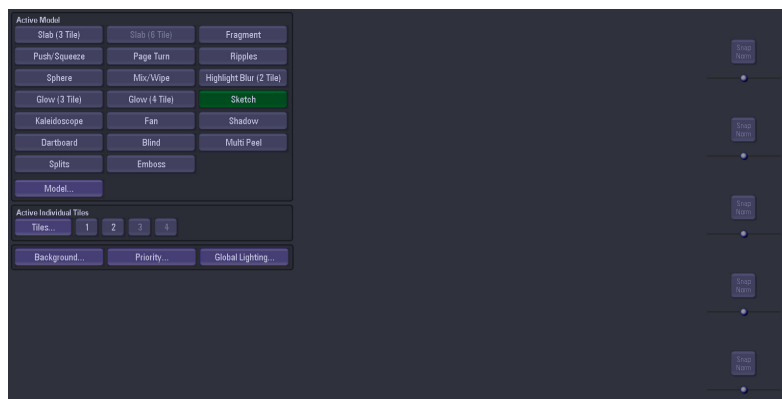
Original DVE Source

DVE Source with Sketch Turned On

Touch the attacher with the Effect Level parameter to reveal all the main adjustment parameters.
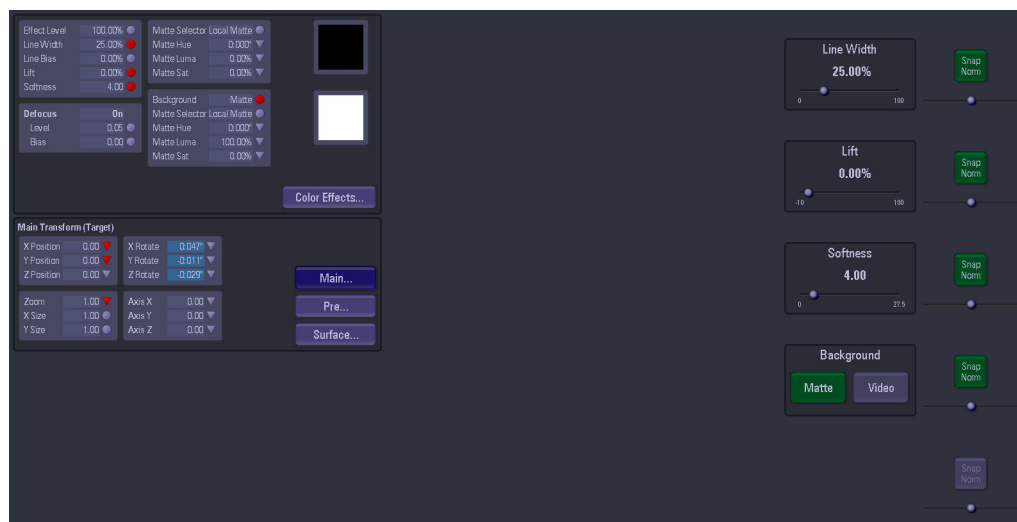
The **Effect Level** is set at 100% so the surface source will have the full sketch effect added to it. With the parameter set at 0% the source will look normal.

Line Width - widens and narrows the Pen/Pencil line that the surface is drawn with.

Line Bias - changes the black level of the line to make the lines look thicker or almost disappear.

Lift - sets the Luma level -100% maximum brightness, +100% changes the surface to black
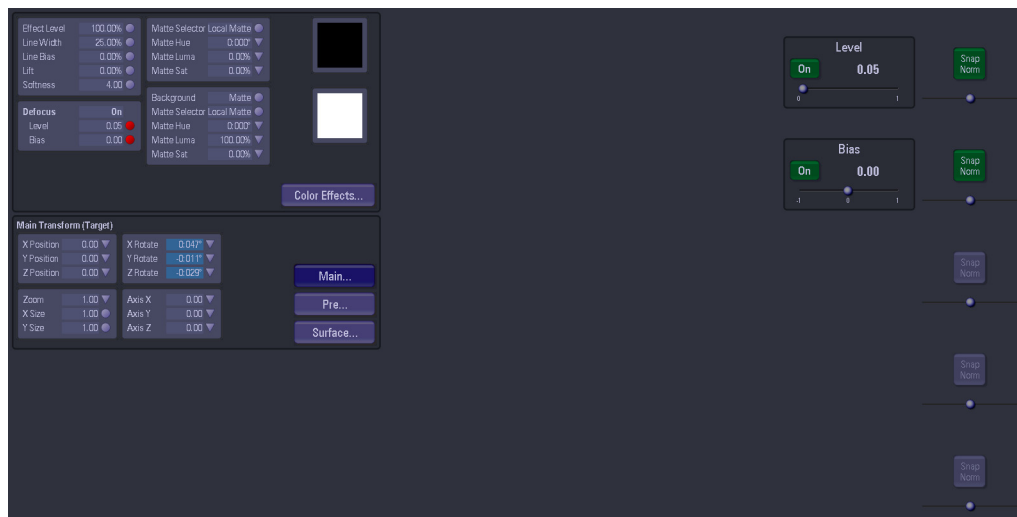
Defocus - turns the focus adjustment On/Off in conjunction with the Bias and Level parameters.

Level- sets the amount of defocus to the source

Bias - this changes the focus bias from the sketch lines to the background

Matte Select - selects one of available Mattes or a Local Matte, which can be adjusted by the parameters in this menu. The Matte Hue, Luma and Sat parameters will only work when the Matte Select parameter is set to Local Matte.
Matte Hue - adjusts the Hue of the Local Matte color. With the Luma and Sat parameters set to 100%, rotating the Matte Hue wheel will set the Hue to the following:

0 = Red, 60 = Magenta, 120 = Blue, 180 = Cyan, 240 = Green, 300 = Yellow
Or can be adjusted as required.

Matte Luma - sets the Luminance or brightness control that affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no luminance or Black and 100% is maximum brightness.
Matte Sat - The saturation control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no saturation or no color i.e. only shades of Gray and 100% is fully saturated or maximum color.Crop Control Parameters

Background - will select between a Matte or video source for the background color of the surface.

Matte Select - selects one of available Mattes or a Local Matte, which can be adjusted by the parameters in this menu. The Matte Hue, Luma and Sat parameters will only work when the Matte Select parameter is set to Local Matte.
Matte Hue - adjusts the Hue of the Local Matte color. With the Luma and Sat parameters set to 100%, rotating the Matte Hue wheel will set the Hue to the following:

0 = Red, 60 = Magenta, 120 = Blue, 180 = Cyan, 240 = Green, 300 = Yellow
Or can be adjusted as required.

Matte Luma - sets the Luminance or brightness control that affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no luminance or Black and 100% is maximum brightness.
Matte Sat - The saturation control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no saturation or no color i.e. only shades of Gray and 100% is fully saturated or maximum color.Crop Control Parameters

Color Effects

This allows the user to adjust the color of the selected DVE model, there are a range of adjustments and effects that can be applied.
The main color adjustment parameters are the same color effects that are used in the Color Correction menus throughout Kahuna.
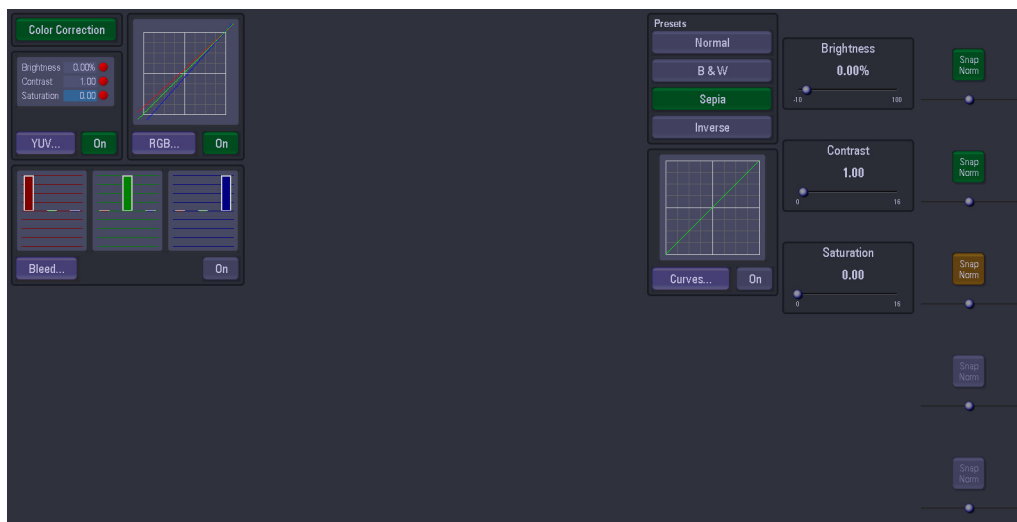
The color correction part of the menu allows the user to change the color balance of the DVE surface, there are 4 types of control, YUV, RGB, Bleed and Preset.

To use the color correction options, press the **{Color Correction}** button in the main menu and the button will go Green.

The basic controls of **Brightness**, **Contrast** and **Saturation** can now be adjusted using the parameter controls.

DVE Model - Sketch YUV

Press the **{YUV...}** button to enter the **DVE Model - Sketch YUV** menu.
The **Main** attacher displays the On/Off status of the YUV Control, RGB Control and the Bleed Control.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments made will be turned Off; but not lost, they will all become active again when the Color Correction button is turned On.

Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and Saturation can be adjusted.

- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn Orange and the percentage of adjustment is shown.

DVE Model - Sketch RGB

Press the **{RGB...}** menu button to enter the **DVE Model - Sketch RGB** menu.

The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time.
When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.

Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas. Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White Level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

DVE Model - Sketch Bleed

Color bleed is a situation where a single color will over power the other colors an RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.

Again make sure the Source Correction is turned On.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attachers to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a -100% to a +100% scale. Each parameter menu will adjust a single color, i.e. red into red, green into red and blue into red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

DVE Model - Sketch Curves

This function is used to add artistic type effects to a DVE surface such as Solarize and Posterize, and also allows the user to setup user defined effects.
To use Curves the option has to be turned On in the DVE Surfaces main menu as shown below, then enter the Color Effects menu and press the Curves menu link button.

The user can select from 6 Preset Curve options or use the Type parameter to select from a list of options. To use the Curves choose the type of effect required, once selected, the user can then manipulate the effect using the parameter controls.

Level - changes the level of effect on the selected surface, from a normal looking still/clip to an extreme manipulation effect.
Type - as mentioned above selects the type of effect.
Steps - the more steps there are in an effect, the less extreme the effect.
Threshold - adjusts the light and dark portions of the source
Frequency - only works with certain functions, and determines how often the Steps are applied to the effect
Phase - adjusts the effect starting point within the Step cycle

DVE Model - Sketch Presets

Presets allow the user to quickly select commonly used preset color options for the DVE source, or quickly revert back to the original DVE source color levels.

Normal - is the original color levels of the DVE source; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original DVE source can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen
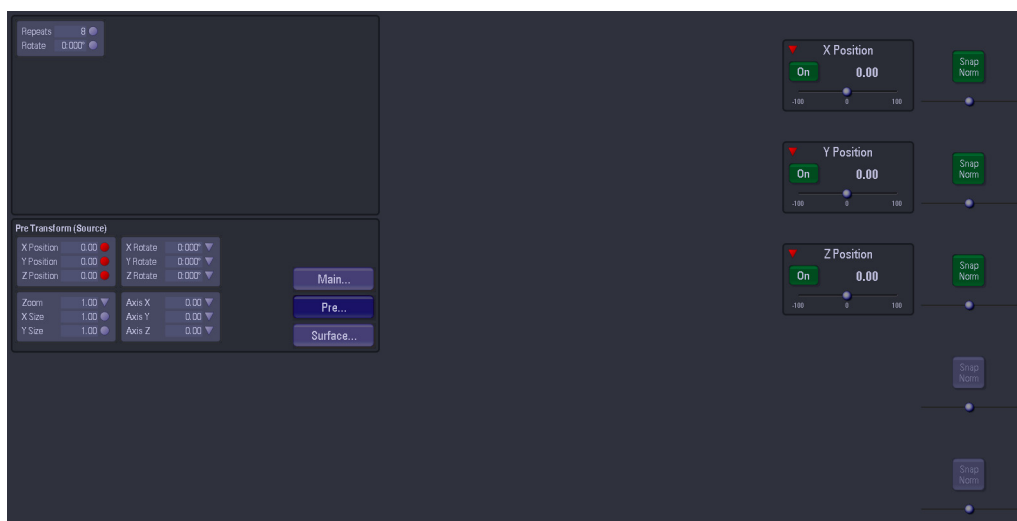
Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

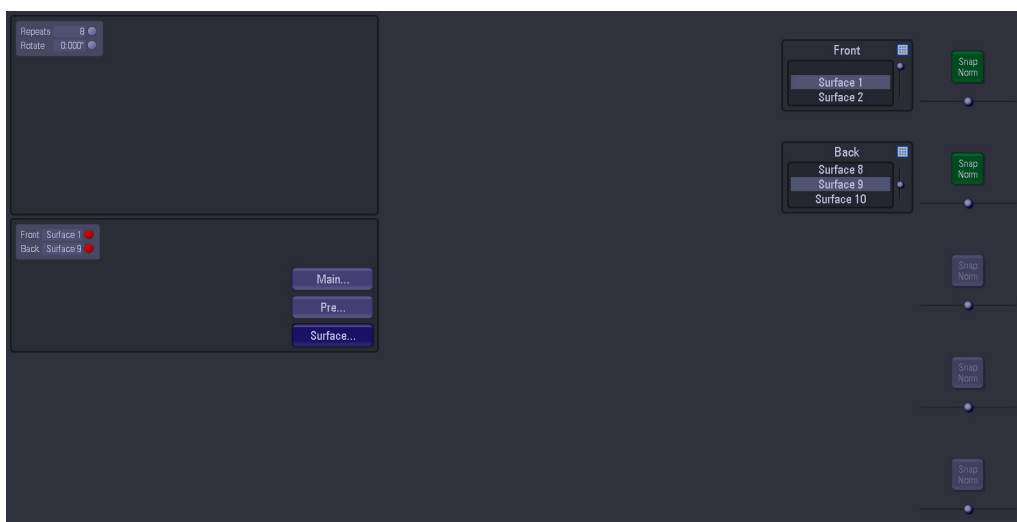**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Lines from (Front) - selects the source for the Lines on the front surface.

Lines from (Back) - selects the source for the Lines on the back surface.

Background (Front) - selects the source for the background on the front surface.

Background (Back) - selects the source for the background on the back surface.

DVE Model - Kaleidoscope

This DVE model displays a Kaleidoscope effect to a tile surface.

Original DVE Source

DVE Source with Kaleidoscope Turned On
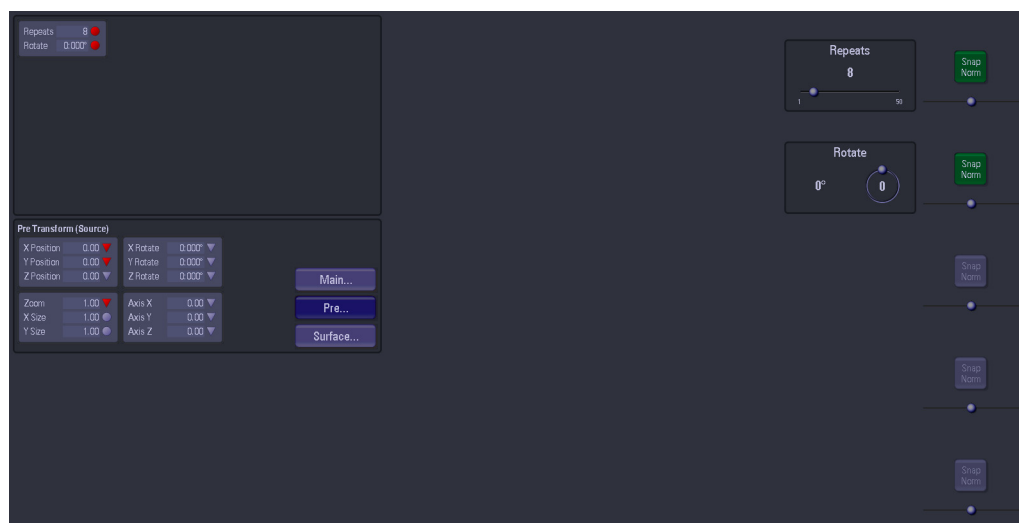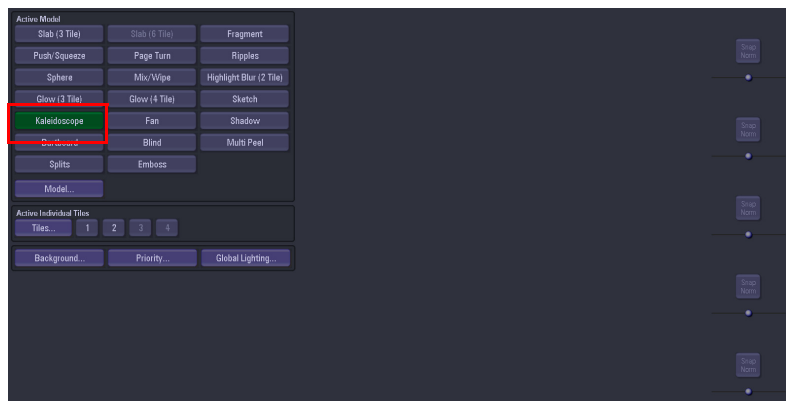
Repeats - determines the number of segments in the Kaleidoscope effect, minimum of 1, maximum of 50

Rotate - rotates the segments into each other

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen
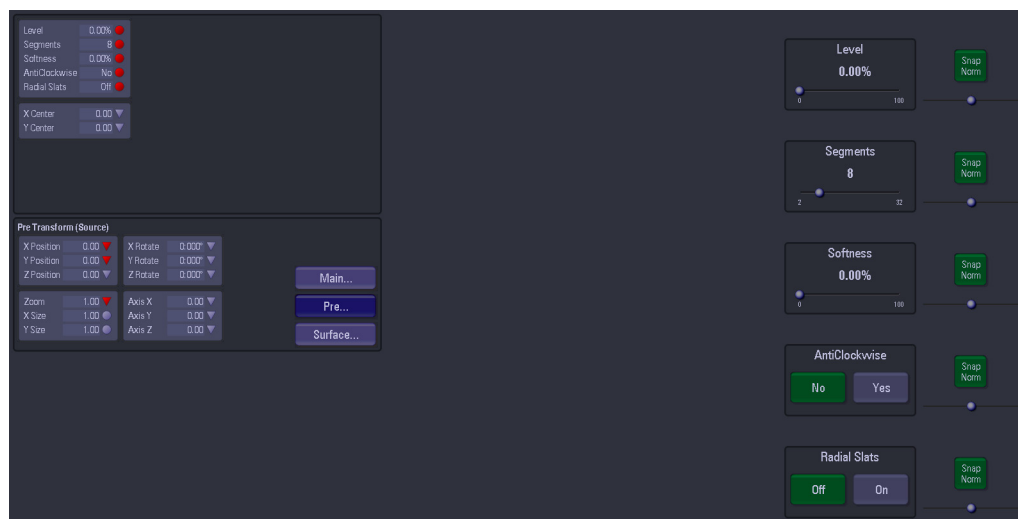
Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

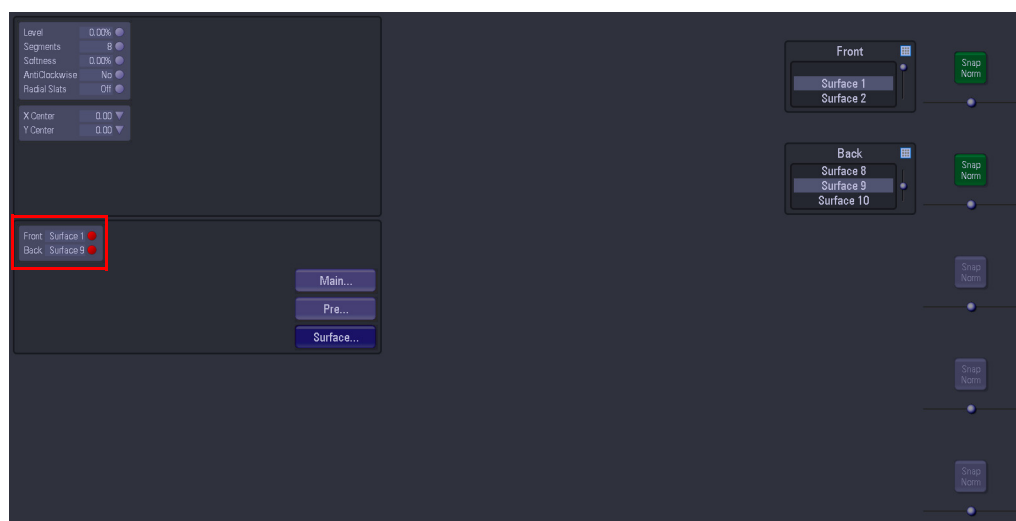**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front - selects the source for the front surface.

Back - selects the source for the back surface.

DVE Model - Fan

This DVE model is able to display a "Fan" effect to a DVE Surface

Two examples of DVE Fan Model
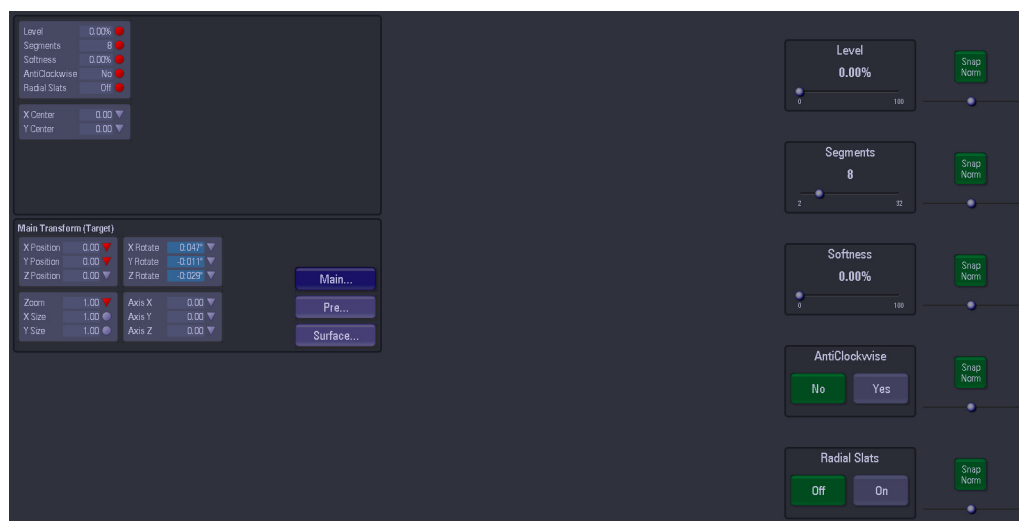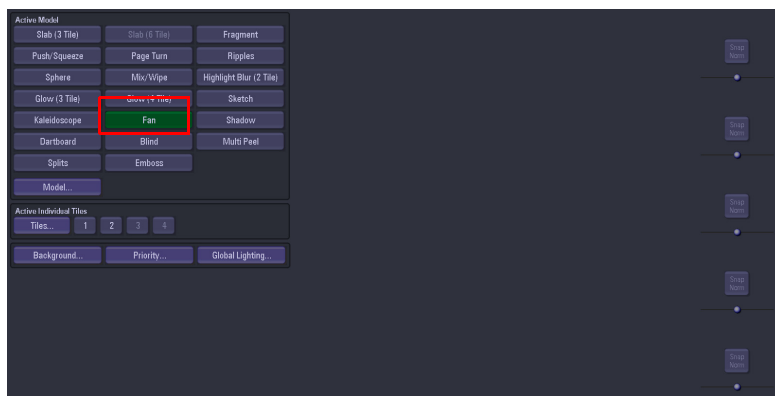
Level - sets the open position of the Fan, i.e. how far the Fan has opened. The fan will open clockwise by default.

Segments - sets the number of segments in the Fan, minimum 2 segments, maximum 32 segments.

Softness - sets the softness of the edges of the Fan

AntiClockwise - causes the Fan to open AntiClockwise

Radial Slats - give the effect that the tile is being rotated and causes the Fan to break up into sections and reveal the image or surface in the background
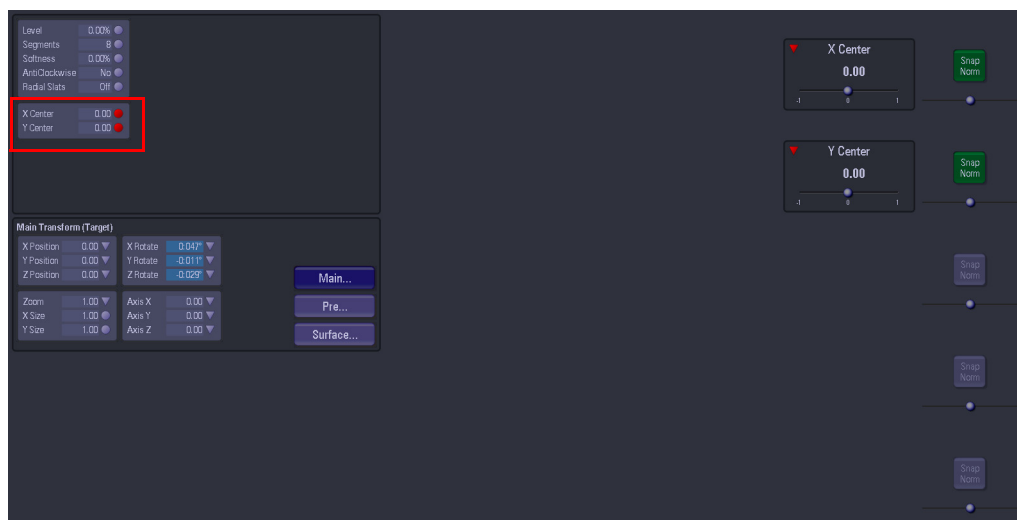
X Center - moves the center of the Fan along the X axis

Y Center - moves the center of the Fan along the Y axis

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface - selects front surfaces 1 to 16

Back Surface - selects back surfaces 1 to 16

DVE Model - Shadow

The Shadow model is used to generate either Drop Shadows or Cast Shadows from a DVE model onto a background source.

DVE Shadow Model

Background   *Shadow*
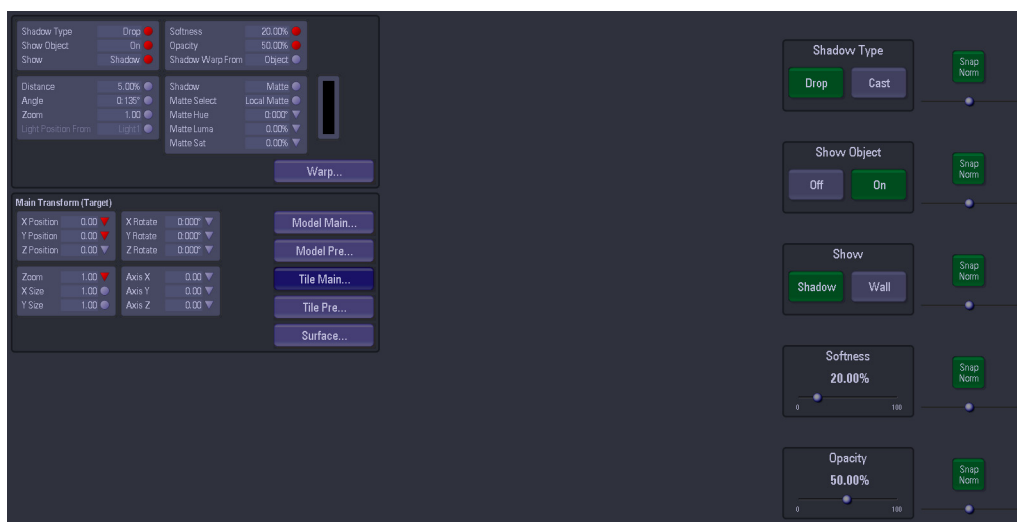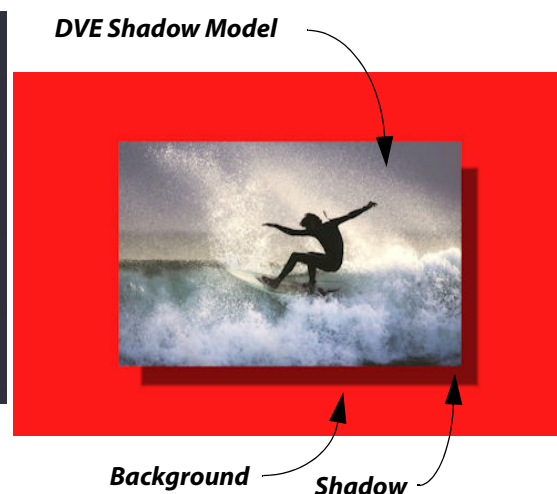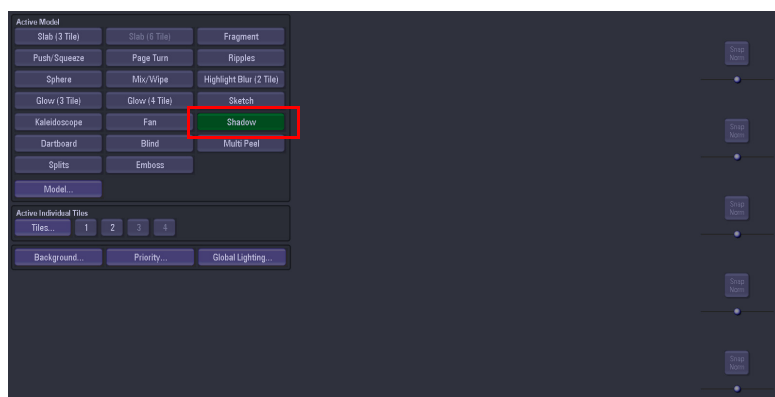
The 'Cast' shadow projects a shadow from the surface light via the object onto the wall. The 'Drop' shadow is much more like a drop shadow as shown in the picture example above. It makes a color-filled copy of the object

The first thing to consider is what kind of Shadow is required, for this example we will talk about Drop Shadow type.

Difference between Cast and Drop Shadow Type

Drop Shadow Type mode gives an illusion of a shadow, but is actually just a shifted copy of the tile filled with a matte color.

Cast Shadow Type the software projects a real shadow from the surface's light source, over the object onto the wall.

Using Shadow Model

In the **DVE Model - Tile Background** menu, select the background or "Wall" the shadow will be cast as described below onto.

This menu allows the user to apply a background behind the DVE Shadow Model without the need for using a Key Layer.
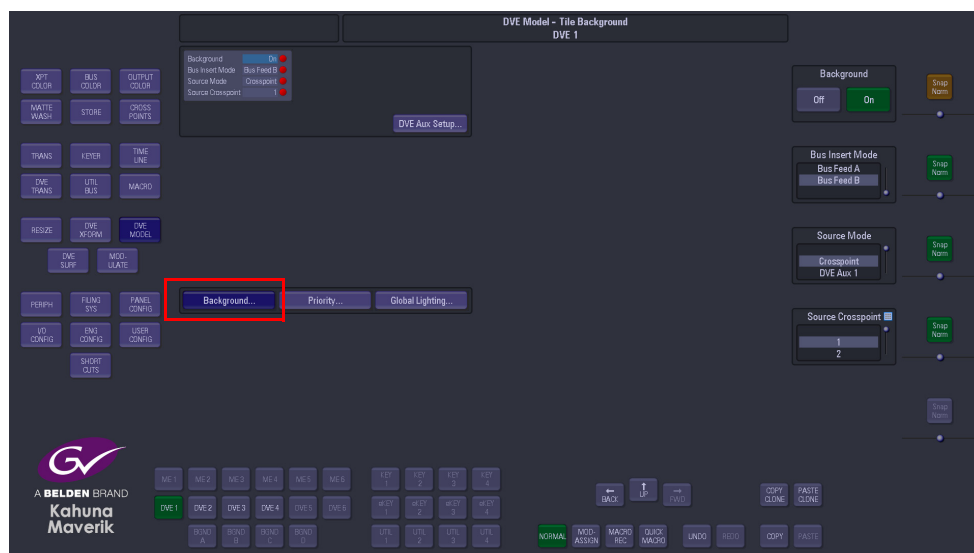
With the Background parameter turned On, use the **Bus Insert Mode** to select between Source based or Bus Feed A/B as the background. Then use the **Source Mode** parameter to select Crosspoint or DVE Aux 1 to 16 as the background behind the DVE Shadow model.
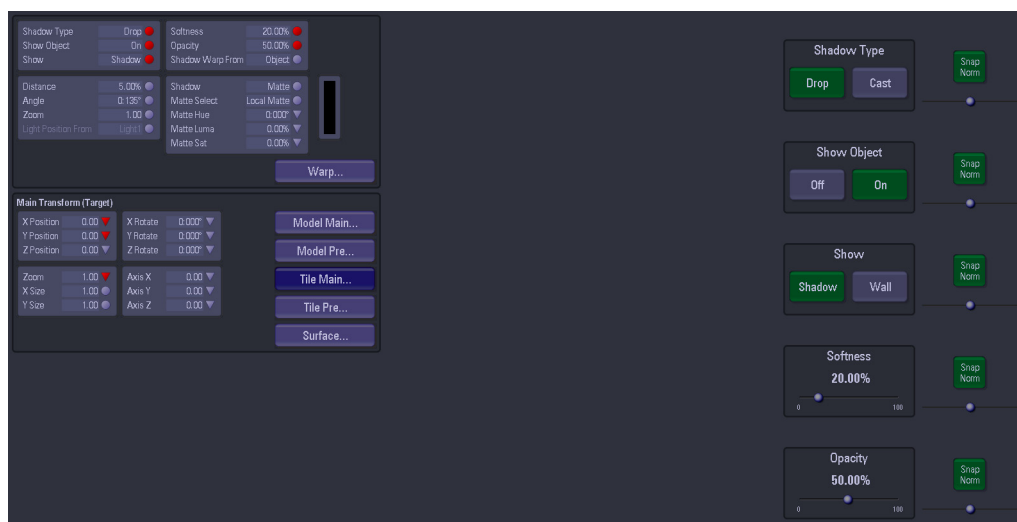
Shadow Type - this selects between Drop and Cast shadow

Show Object - displays or removes the Object (DVE Model) that drops or casts the shadow

Show - displays the Wall that the DVE surface casts or drop the shadow on to, or the Shadow cast by the DVE surface.
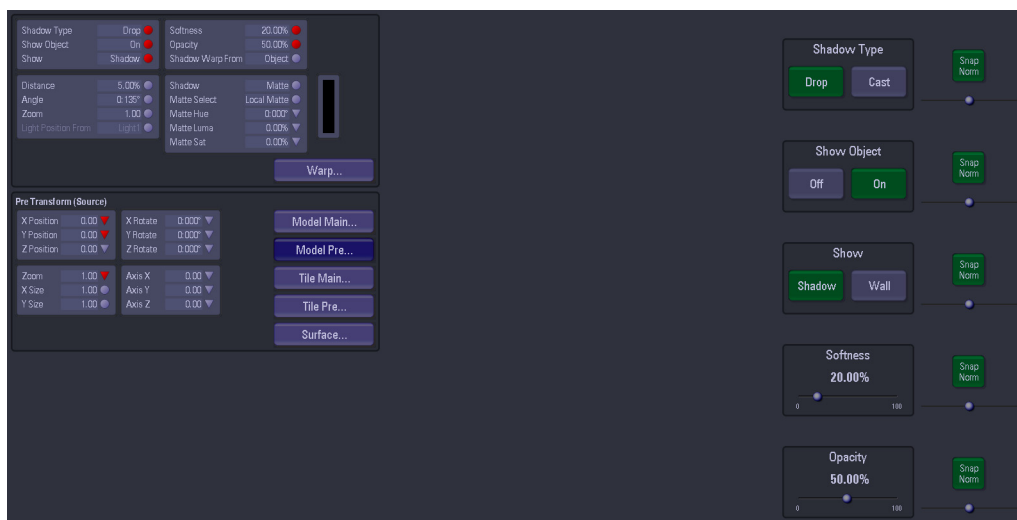
Softness - softens the outside edges of the shadow

Opacity - changes the shadow from being a solid form through to the shadow disappearing.

S**hadow Warp From** - this selects which surface the warp options can be applied to.
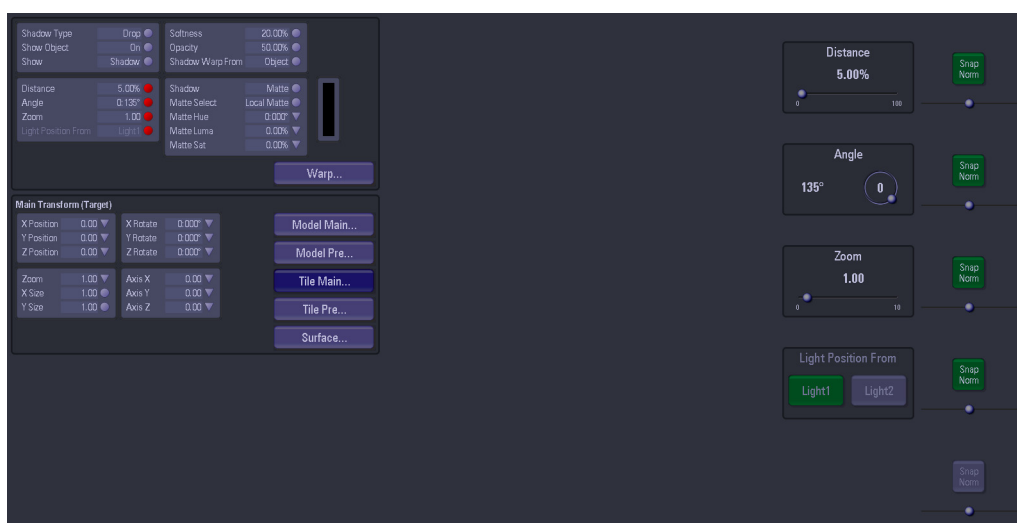
Distance - this will move the shadow away from the object, the direction of movement depends on the angle of the shadow.

Angle - the angle that the shadow is cast onto the wall

Zoom - this will move the shadow closer to or away from the object, as the shadow moves away it will get smaller, as if moving the object away from the wall.

Light Position From - allows the user to choose whether the position of the Light or the Shade is used.
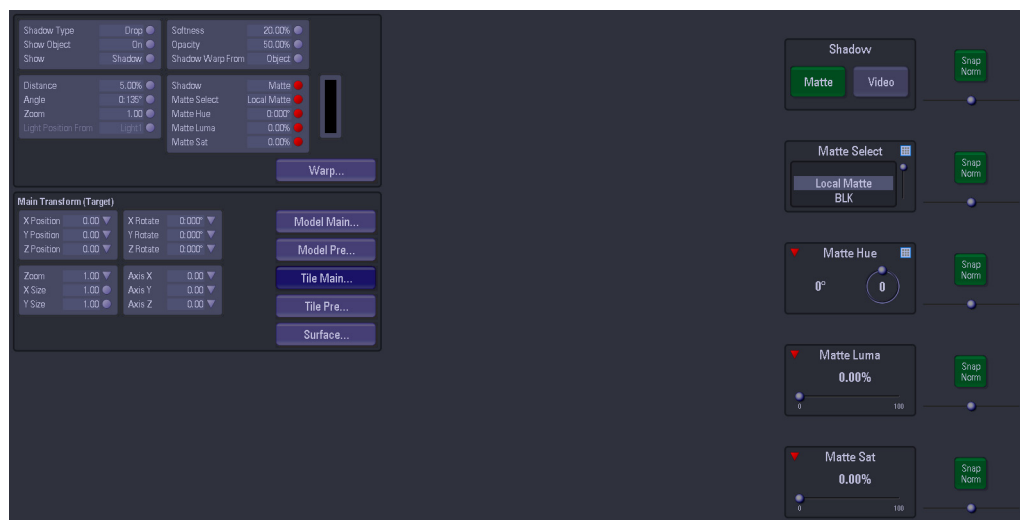
Shadow - selects either a Matte as a shadow or one of the DVE surfaces for the Video setting. The matte color is setup in this menu using the parameter controls listed below. The Video or DVE surfaces are set in the "Surface..." menu, accessed by pressing the {Surface...} button at the bottom of the menu.

Matte Select - selects one of available Mattes or a Local Matte, which can be adjusted by the parameters in this menu. The Matte Hue, Luma and Sat parameters will only work when the Matte Select parameter is set to Local Matte.

Matte Hue - adjusts the Hue of the Local Matte color. With the Luma and Sat parameters set to 100%, rotating the Matte Hue wheel will set the Hue to the following:

0 = Red, 60 = Magenta, 120 = Blue, 180 = Cyan, 240 = Green, 300 = Yellow
Or can be adjusted as required.

Matte Luma - sets the Luminance or brightness control that affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no luminance or Black and 100% is maximum brightness.

Matte Sat - The saturation control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no saturation or no color i.e. only shades of Gray and 100% is fully saturated or maximum color.Crop Control Parameters.

Shadow - Warp

The Warp menu allows the user to apply various effects to individual tiles.

To use the Warp functions touch the **Tile Selector** attacher then select "Object" if the DVE surface is to have the warp effects applied, or "Wall" is the warp effects are to affect the wall behind the DVE surface.
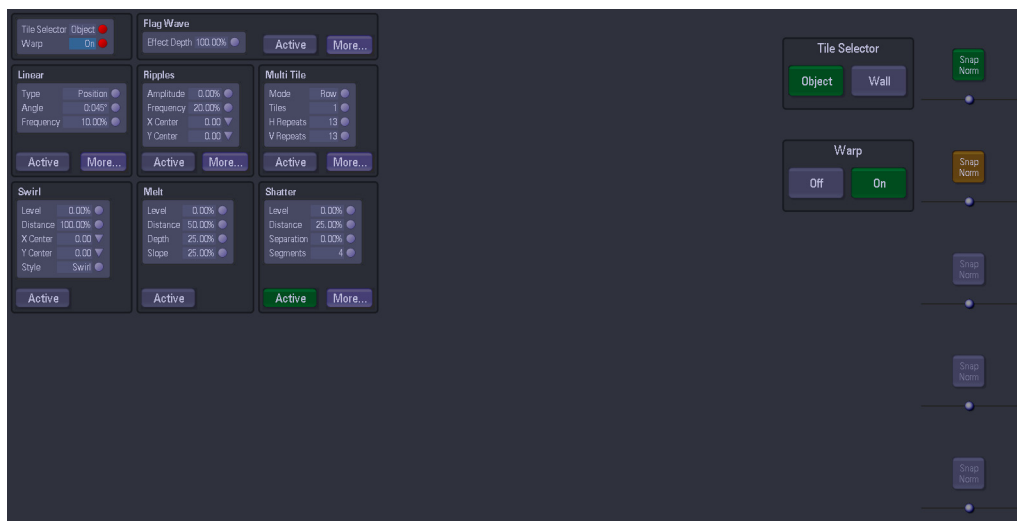
Flag Wave

Flag Wave is a multi tile Warp effect that simulates a flag waving in the wind.
Once the Warp function is turned On, press the **{Active}** button then Flag Wave will start at a preset level.
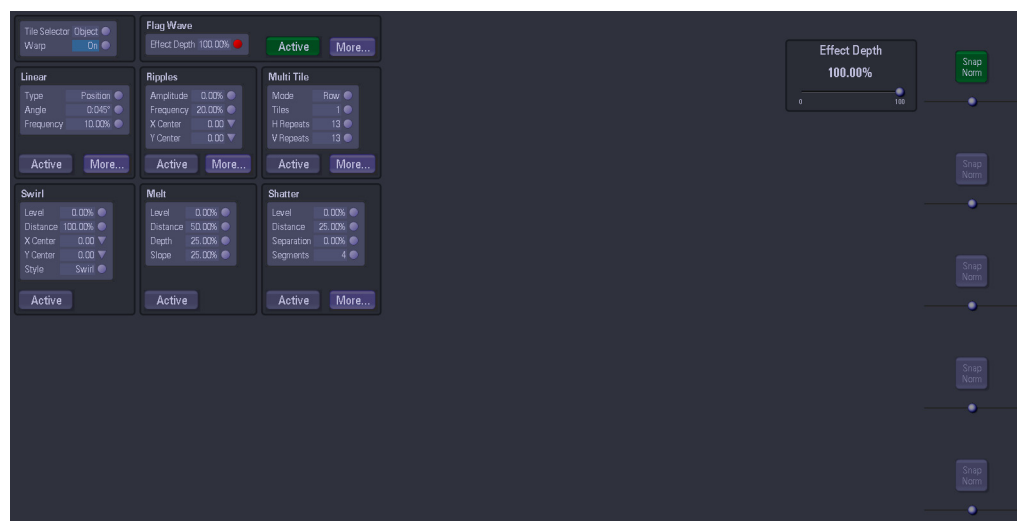
Effect Depth parameter is a coarse **"frequency"** adjustment, 0% will stop the flag wave motion, and 100% is at maximum level.
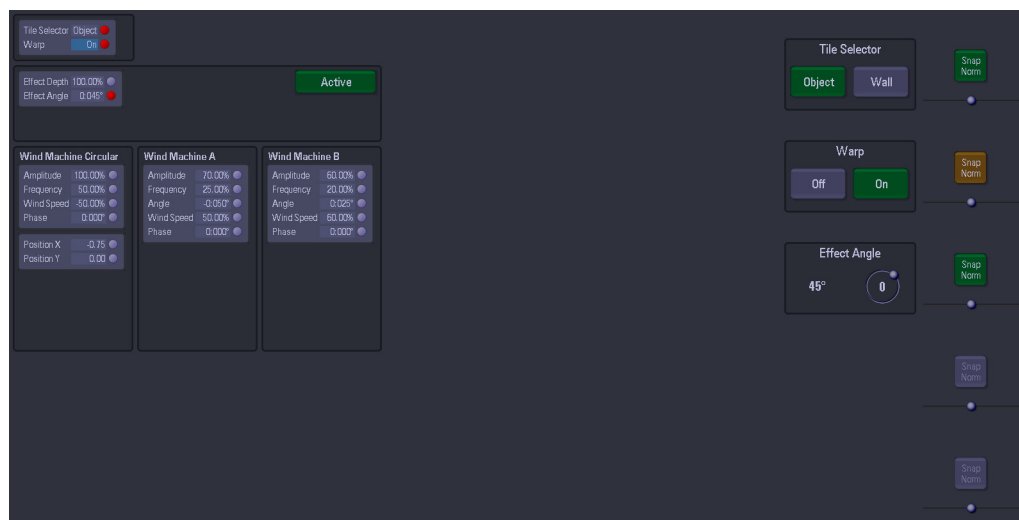
The menu above shows that the Flag wave warp is On, the Effect Depth and Effect Angle are both coarse adjustments, the Effect Depth is the same adjustment as explained in the previous menu.

Effect Angle - adjusts the angle at which the wind hits the tile

Wind Machine Circular creates a curved edge to the Wind Ripple effect as it passes over the tile.

Amplitude - controls the intensity of the 'circular shape cycle', the larger the amplitude the more dramatic the wind ripple

Frequency - determines how often the wind ripple is applied to the tile

Wind Speed - this adjusts the wind speed and wind direction, the preset level is left to right at 50%, if the parameter is changed to +100% the wind direction is from right to left at maximum speed

Phase - adjusts the warp starting point within the 'circular shape cycle'

Position X and Position Y - this moves the center point at which the circular wind ripples start.

Wind Machine A and **Wind Machine B** provide the same Wind Ripple effect, but can be adjusted allow wind ripples to hit the tile from different directions, the only difference between, the adjustment they provide and the Wind Machine Circular is the Angle adjustment.

Amplitude - controls the intensity of the 'circular shape cycle', the larger the amplitude the more dramatic the wind ripple

Frequency - determines how often the wind ripple is applied to the tile

Angle - this changes the angle at which the wind ripples strike the tile

Wind Speed - this adjusts the wind speed and wind direction, the preset level is left to right at 50%, if the parameter is changed to +100% the wind direction is from right to left at maximum speed

Phase - adjusts the warp starting point within the 'circular shape cycle'

DVE Shadow Model with Warp Flag Wave

Linear

This effect allow linear lines of warping effects.
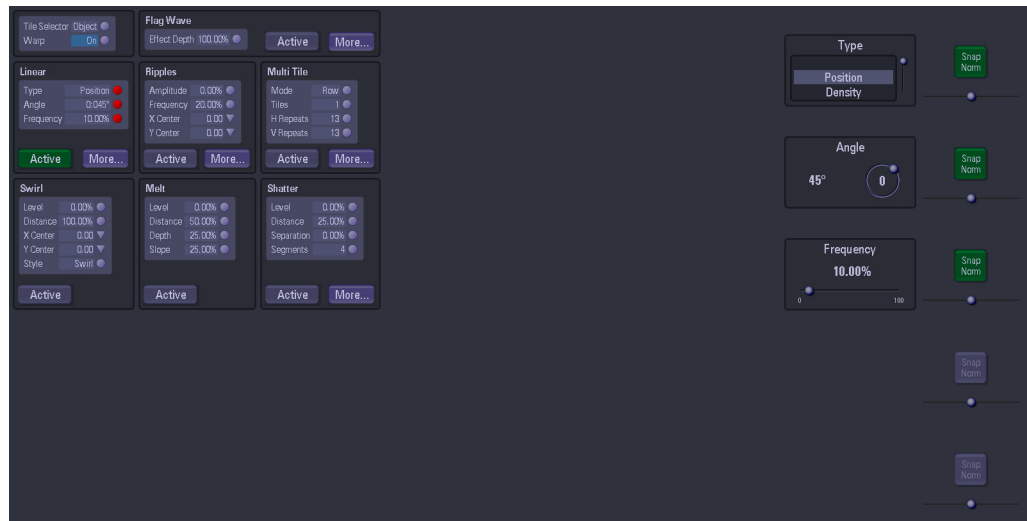
Main menu adjustments:

Type - selects between the three states of Warp, Position, Density and Independent.
They all have a similar effect on a tile, it is down to the user's discretion which one to use to create the desired effect on a tile.
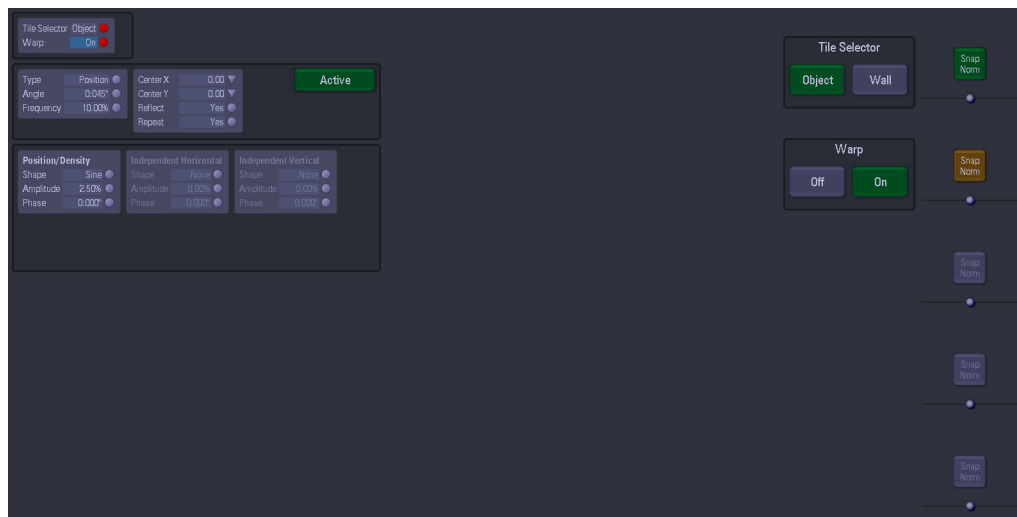
- **Position** - moves the DVE model pixels in the direction of the angle, according to the Shape pattern chosen
- **Density** - stretches or squashes the width of each DVE model pixel perpendicular to the angle, in accordance with the Shape pattern chosen.

Angle - decides what rotation is applied to the effect

Frequency - determines how often the warp is applied to the tile

Example of Position Warp as a Sine shape

Type - selects between the three states of Warp - Position, Density and Independent

Angle - decides what rotation, is applied to the effect

Frequency - determines how often the warp is applied to the tile

Center X - determines the center of the warp, on the X-axis

Center Y - determines the center of the warp, on the Y-axis

Reflect - when set to Yes applies a warp to the entire tile, when set to No will warp one half of the tile

Repeat - when set to Yes the warp pattern is repeated throughout the tile, when set to No the warp pattern will appear only once.

Independent Horizontal/Independent Vertical - (these parameters will only work when the "**Type**" parameter is set to Independent) these are a secondary adjustment to the linear warp. They allow the user to have individual control over both the Horizontal and Vertical Warp settings of each tile these attachers control the Shape, Amplitude and Phase of the Warp.

Shape - determines the shape of the edge of the Warp effect in Position mode, (eg. Sine = sine curve cycle) and the shape of pixel-width spread in Density mode

Amplitude - controls the intensity of the 'Shape cycle', the larger the amplitude the more dramatic the warp

Phase - adjusts the warp starting point within the 'Shape cycle'

Ripples

This adds a Ripple effect to a tile.

Amplitude - controls the intensity of the 'Shape cycle', the larger the amplitude the more dramatic the Ripple

Frequency - determines how often the Ripple is applied to the tile

X Center - moves the Ripple center left or right

Y Center - moves the Ripple center up or down

Ripples Warp with Amplitude and Frequency turned up

Distance - sets how far the Ripples spread outwards from its center

Width - sets the width between the Ripples

Build Up - applies a softness between the outside ripple and the rest of tile

Decay - applies a softness from the center of the ripple outwards

Effect Style - selects between Angled and Radial effects

Angle - decides what rotation, if any, is applied to the Ripple.

Multi Tile

This menu allows a selection of multiple tile DVE effects to be displayed.

Mode - The multi tile modes as listed below:

Row - Tiles 1 - 8

Column - Tiles 1 - 8

Grid - Tiles 1, 2, 4, 6 - 2X3, 6 - 3X2, 8 - 2X4, 8 - 4X2

Horiz Repeats - his will repeat tiles from 2 times up to 14 times horizontally.

Vert Repeats - this will repeat tiles from 2 times up to 14 times vertically

As shown in the previous menu.

Mode - The multi tile modes as listed below:

- **Row** - Tiles 1 - 8
- **Column** - Tiles 1 - 8

- **Grid** - Tiles 1, 2, 4, 6 - 2X3, 6 - 3X2, 8 - 2X4, 8 - 4X2

Reflected - will add a reflected view of the multi tile setup

Horiz Repeats - his will repeat tiles from 2 times up to 14 times horizontally.

Vert Repeats - this will repeat tiles from 2 times up to 14 times vertically

Horizontal Separation - spreads spaces horizontally in between the selected multi tile pattern

Vertical Separation - spreads spaces vertically in between the selected multi tile pattern

DVE Shadow Multi Tile with 13 Horiz/Vert tiles

Swirl

This adds a Swirl effect to a drop shadow object.
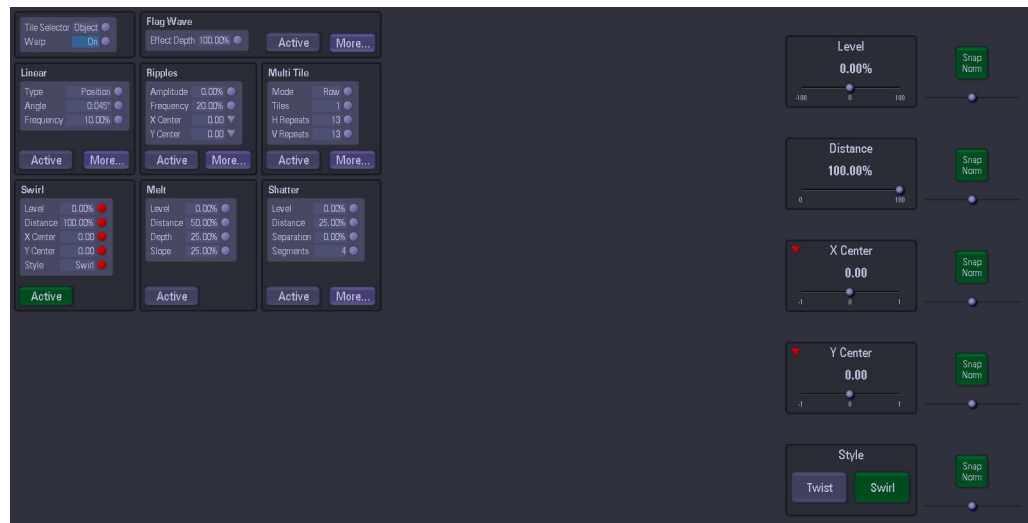
Level - controls the amount of swirl

Distance - sets how far the Swirl spreads outwards from its center

X Center - moves the center of the swirl right or left

Y Center - moves the center of the swirl up or down

Style - the user has 2 choices, Twist or Swirl effect

DVE Shadow with Swirl Warp Effect

Melt

The warp Melt option gives the effect that the DVE model is melting.
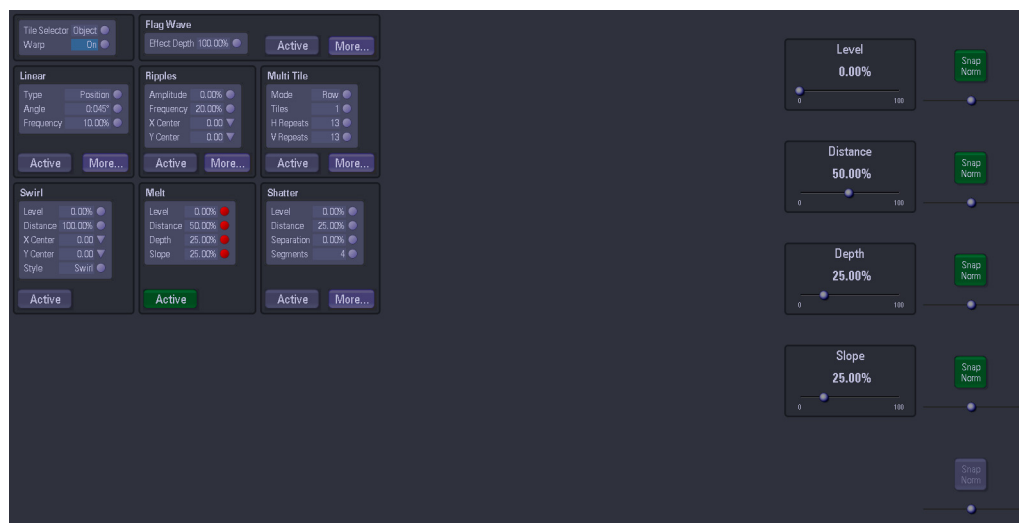
Level - sets the amount of Melt applied to the DVE model

Distance - sets how far the Melt spreads away from the top of the DVE model

Depth - sets the depth for the bottom of the U shape between each melted segment.

Slope - determines whether the Melt will hold a straight line from the top of the screen or if it will gradually slope down the screen from the left as the percentage of the parameter is increased.

DVE Shadow with Melt Warp Effect

Shatter

The Shatter option, as the name suggests, gives the effect that the DVE model being shattered like a pane of glass.
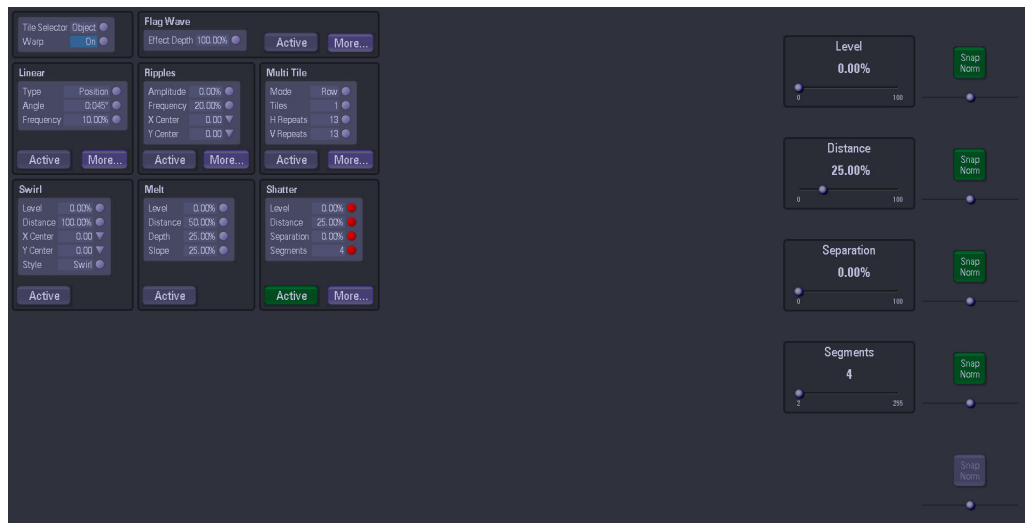
Level - controls the level of the shatter from no shatter to entirely shattered into the pre-determined number of segments and to the pre-determined distance

Distance - sets how far the Shatter spread outwards from its center

Separation - adjusts the distance between the segments

Rotation - adjusts the direction of rotation of the Shatter as it spreads outwards

Segments - selects the amount of pieces the Shatter splits into.

Shatter Effect with X Center adjustment
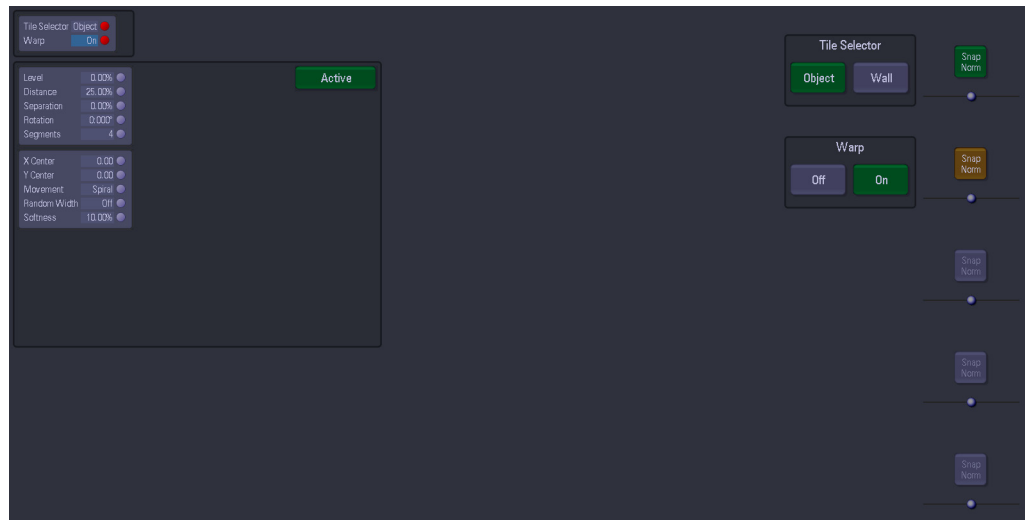
X Center - moves the Shatter center left or right

Y Center - moves the Shatter center up or down

Movement - draws segments from the center, in a non concentric pattern

Random Width - each segment of the shatter is a different size.

Softness - adjusts the softness of the edges of the shattered pieces

Tile Main/Model Main Transform (Target)

This menu is the Main Transform (Target) menu for the DVE Model/DVE Tile. The menu sets which the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Model/Tile Pre Transform (Source)

This menu is the Pre Transform (Source) menu for the DVE Model and Tile, which moves the selected tile/model "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.
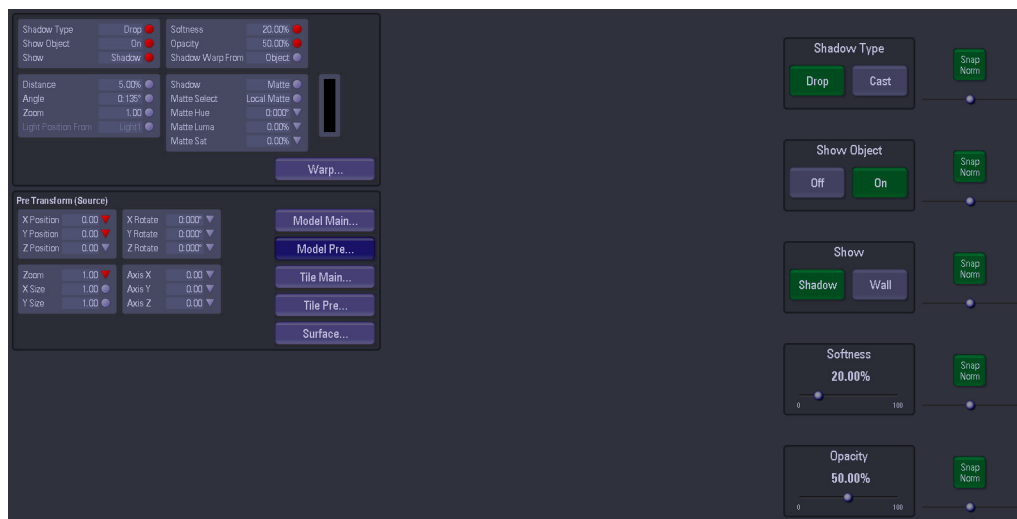
This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters
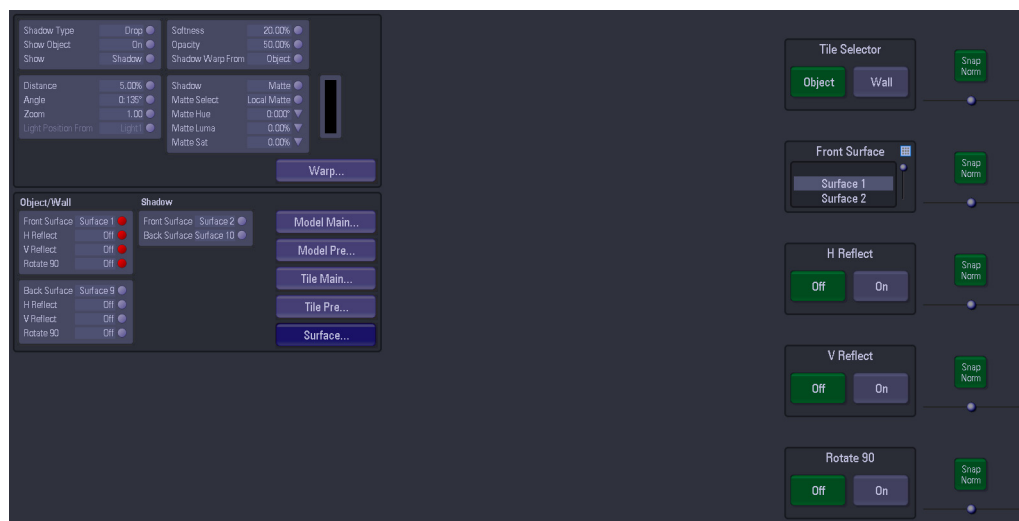
Object/Wall

Front Surface - selects the surface for the front of the object/wall

H Reflect - flips the Object horizontally

V Reflect - flips the Object vertically

Rotate 90 - rotates the object by 90 degrees clockwise

Back Surface - selects the surface for the back of the object/wall

H Reflect - flips the Wall horizontally

V Reflect - flips the Wall vertically

Rotate 90 - rotates the Wall by 90 degrees clockwise

Shadow

Front Surface - selects front surfaces 1 to 16

Back Surface - selects back surfaces 1 to 16

DVE Model - Dartboard

This DVE model displays a Dartboard effect.
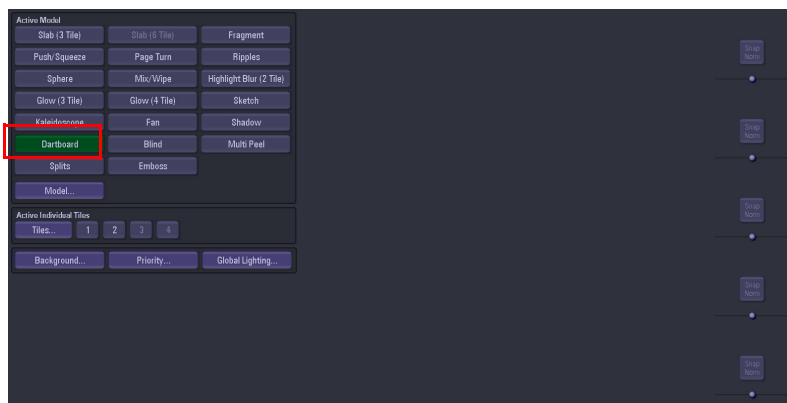
DVE Dartboard Model - Rotate Style

DVE Dartboard Model - Shatter Style
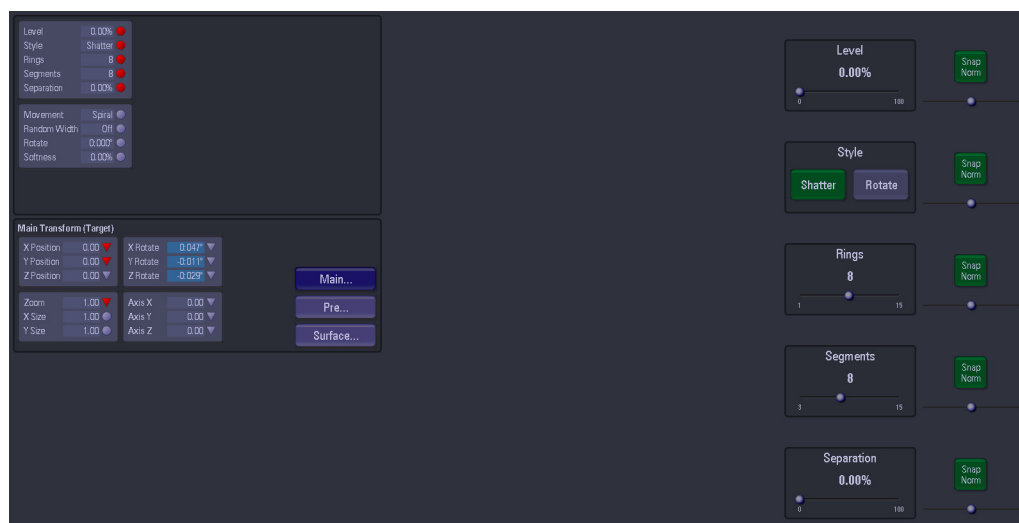
Level - determines the prominence of the dartboard effect on a tile, 0% will display a normal tile, 50% will display half a dartboard effect from the outside of a tile inwards, 100% displays a full dartboard effect

Style - the Shatter style off sets the segments of the dartboard

Rings - determines the number of rings displayed in the dartboard effect minimum is 1 ring, maximum is15 rings

Segments - selects the number of segments in the dartboard, minimum 3, and maximum is 15 segments

Separation - determines the thickness of the segment lines and displays the surface of the second tile
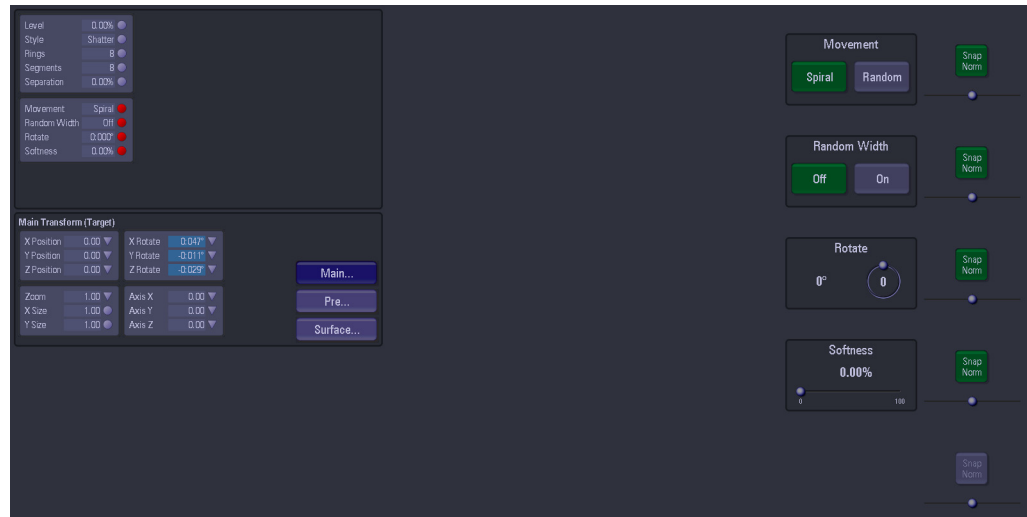
Movement - Spiral when rotated gives a spiral effect, Random makes the segments move in different directions when rotated

Random Width - sets the separation lines to different widths when rotated

Rotate - rotates the dartboard effect around in a circle

Softness - sets the softness of the edges of lines in the dartboard

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface A/B - selects the source for surface A and B

Back Surface A/B - selects the source for surface A and B.

DVE Model - Blinds

Blinds Model provides a "window blind" effect to a DVE tile.

DVE Blind Model set to Slats Style

DVE Blind Model set to Grid Style
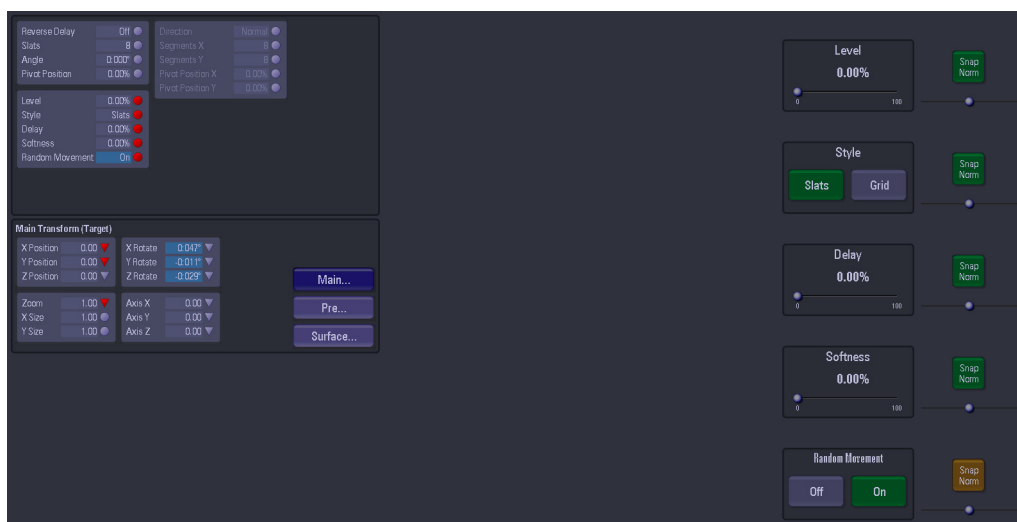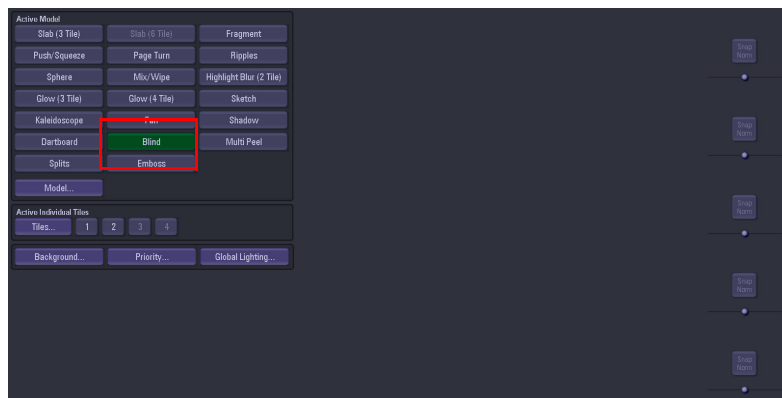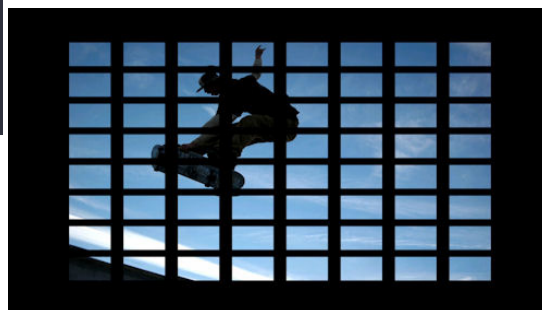
Level - this will give the effect of opening the blinds, revealing the background behind the tile.

Style - changes the blinds style from Slats to a Grid style, when this option has Grid selected, notice that the "Slats" parameter controls are Grayed out and cannot be used.

Delay - The delay parameter controls the time for each slat to open. i.e. If the delay is at 100% and 4 slats are selected then the level controls the opening of each slat individually. When the grid style is selected, the delay path works in the form of a spiral so each slat opens from the outside and spirals towards the middle.

Softness - adjusts the softness of the edges of the blinds

Random Movement - when set to On, this will allow random blind sections to move when adjusted.
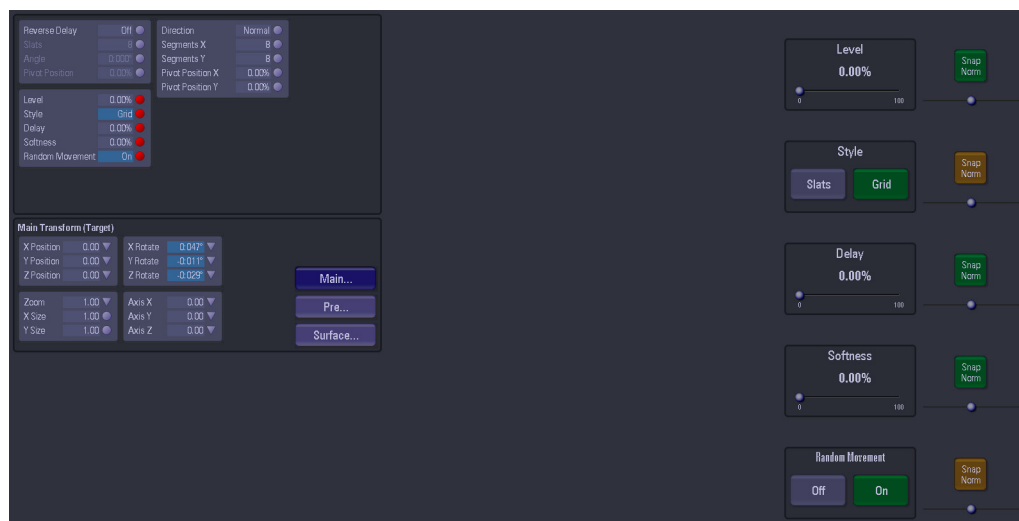
Note: These parameters can only be used when the blinds style is set to "Slats"

Reverse Delay - this reverses the **Delay** function as described on the previous page.

Slats - determines the amount of slats in the blind

Angle - adjusts the angle of the blinds, this will rotate the slats

Pivot Position - adjusts the position at which the angle adjustment will rotate around
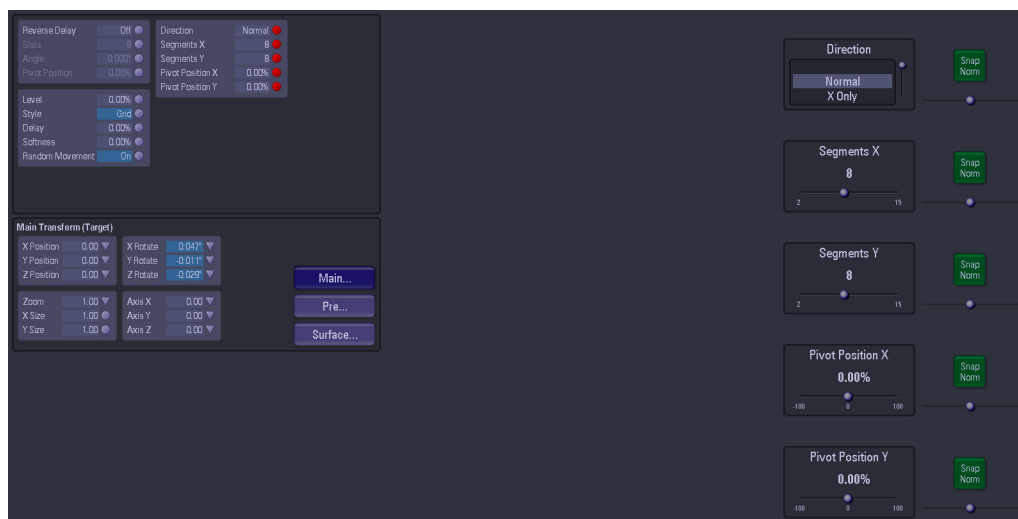
Note: These parameters will only work when the blind style is set to "Grid"

Direction - this parameter has 3 settings Normal, X Only and Y Only, this determines which direction the blinds are segmented into, i.e. if set to "Normal", the blinds will be broken up into a Grid, if "X Only" is selected, the blinds will be vertical.

Segments X, Y - will determine how many segments the blind will be broken up into.

Pivot Position X, Y - this will determine where the pivot point will be either vertically or horizontally.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the tile on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the tile around the center of the axis

Zoom - will zoom the tile up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

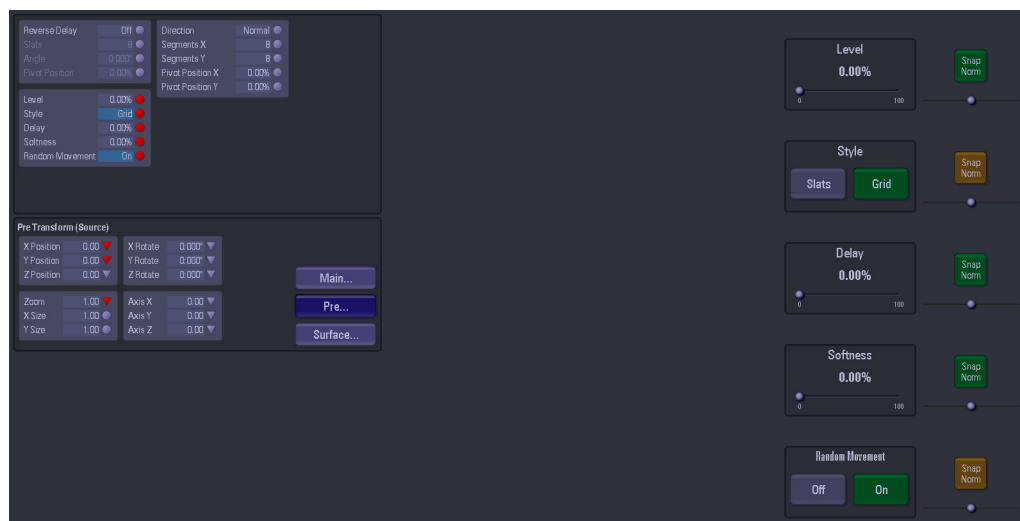**X Rotate** - rotates the tile such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

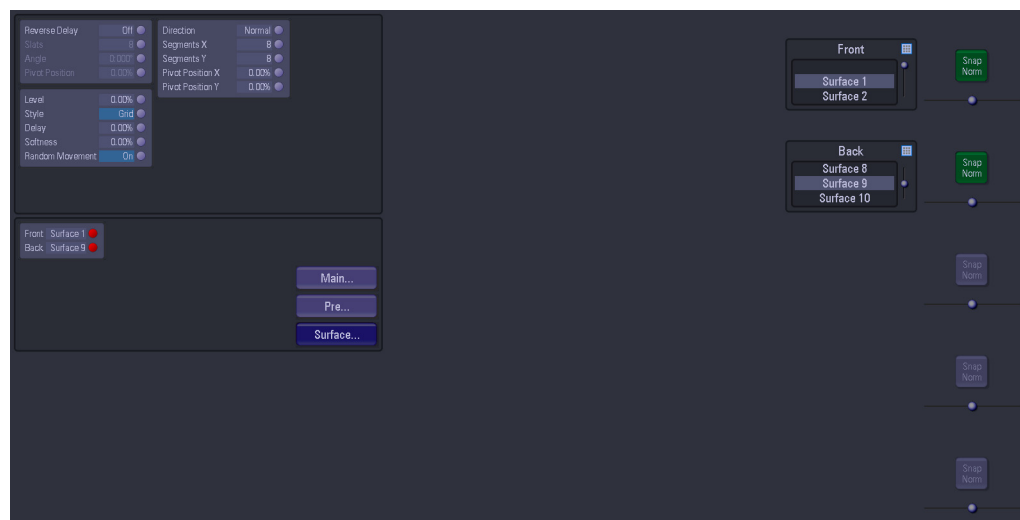**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected tile "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze tile, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface - selects the source for the front surface of the blind

Back Surface - selects the source for the back surface of the blind

DVE Model - Multi Peel

This DVE model is able to display a "peel back" effect to a tile.

DVE Multi Peel model set to 4 peels
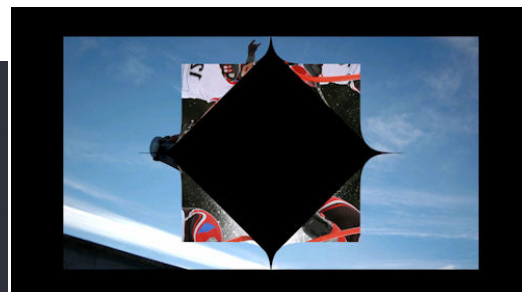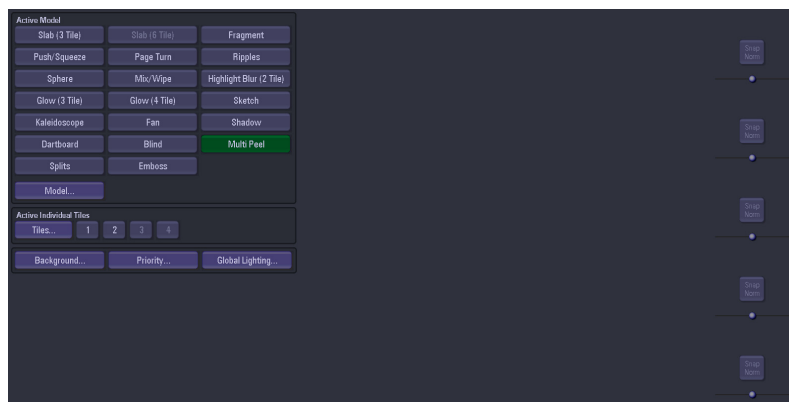

DVE Multi Peel set to 8 peels
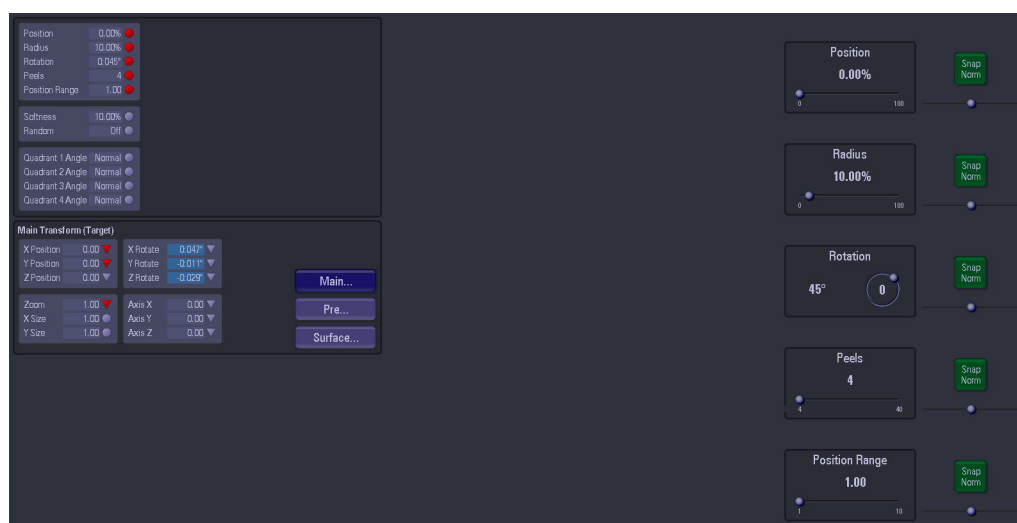
Position - sets the position of the segments being peeled backwards, i.e. how far the segments have been peeled outwards

Radius - sets the distance the segments are allowed to peel outwards from the center

Rotation - sets the angle of the peel

Peels - sets the amount of segments being peeled, 4 is the minimum and 40 is the maximum

Position Range - moves the position of the start point of the peel on the tile
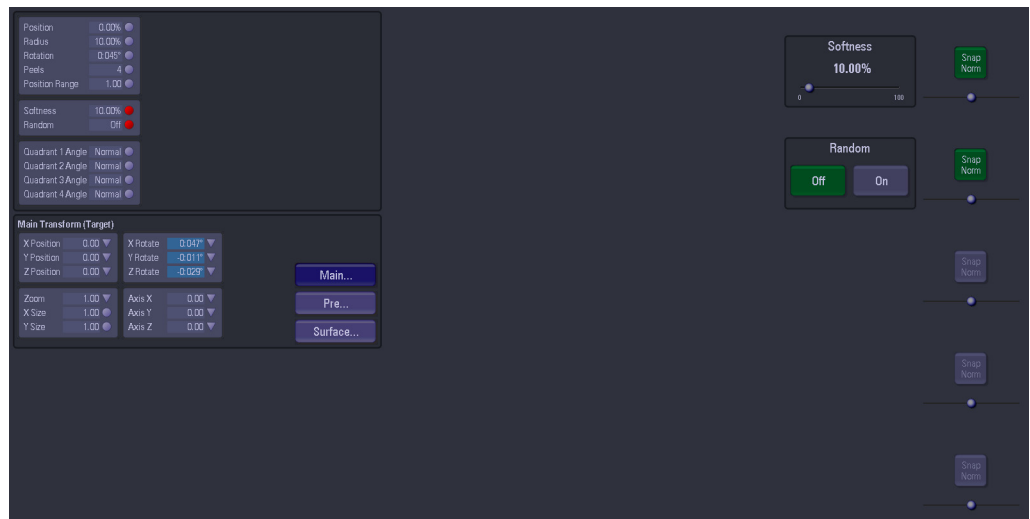
Softness - sets the softness of the edges of the peel

Random - sets the peel edges to random states of peeling, i.e. one peel edge may be fully peeled back, and the peel edge next to it may only just be starting to peel back.
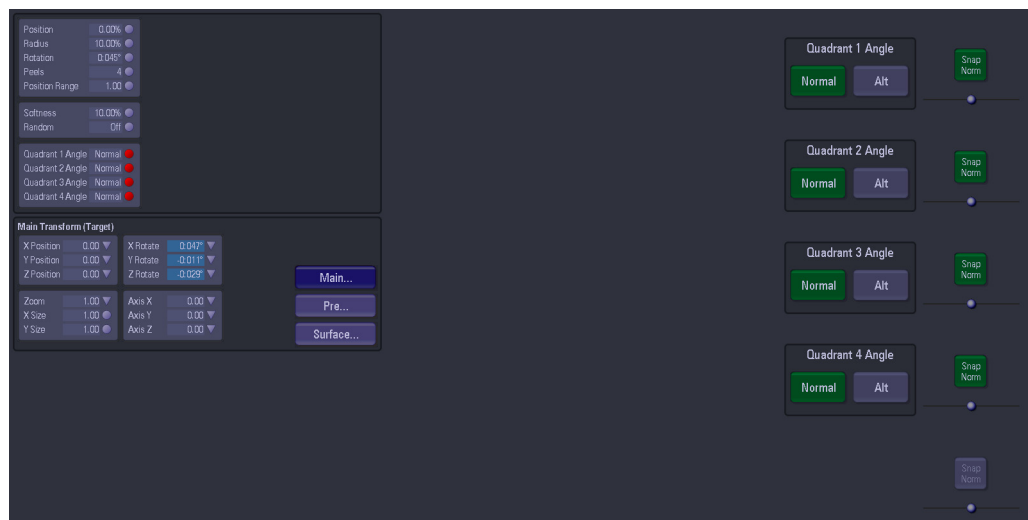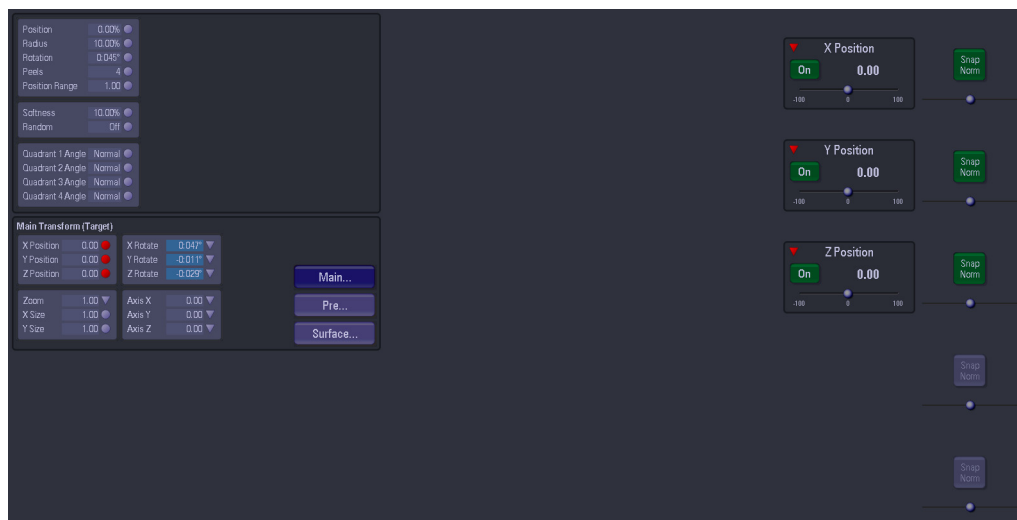

Note: The Quadrant Angle parameters will only work when the "Peels" parameter is set to 4 peels.

Quadrant 1, 2, 3, and4 Angle - alters the angle that the segments get peeled backwards, there are two settings, **Normal** and **Alt**. these are most noticeable as the peel is adjusted by the rotation.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the model on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the model around the center of the axis

Zoom - will zoom the model up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the model such that the left and right sides turn into the screen
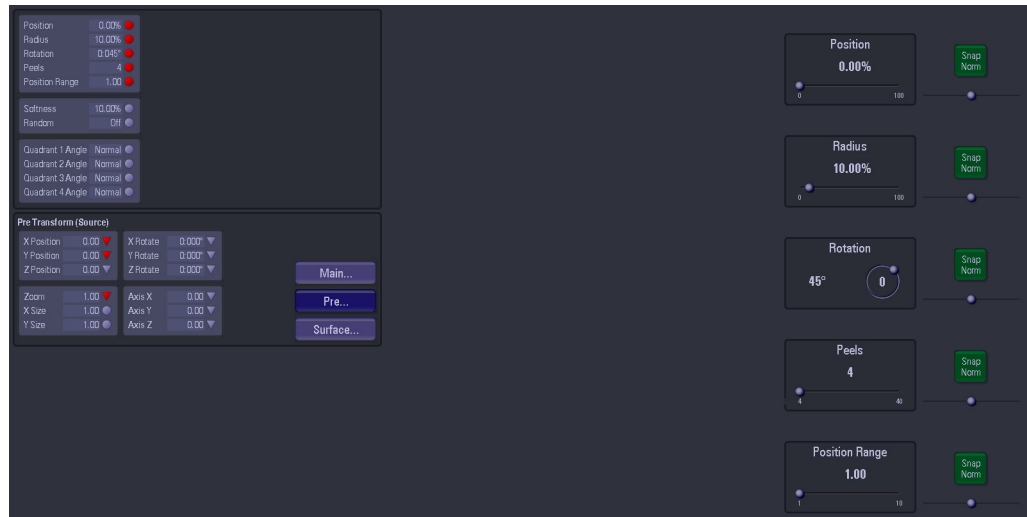
Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the model clockwise/counter-clockwise

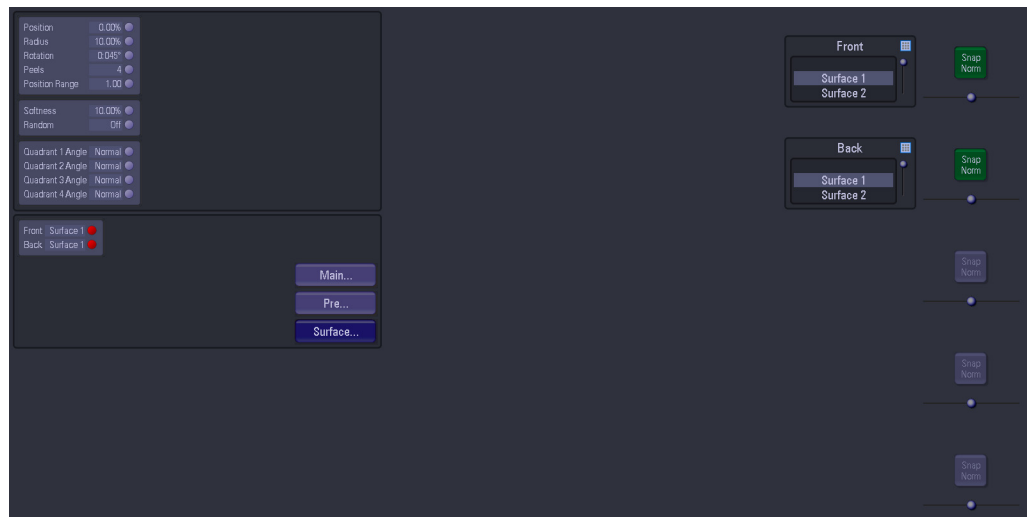**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected model "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze model, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.

Surface Parameters

Front Surface - selects the source for the front surface of the model

Back Surface - selects the source for the back surface of the model

DVE Model - Splits

This function splits the tile into a number of parallel strips and pulls alternate strips of the tile apart along a pre-determined angle.

DVE Splits every other segment moves away in a vertical direction (up or down)
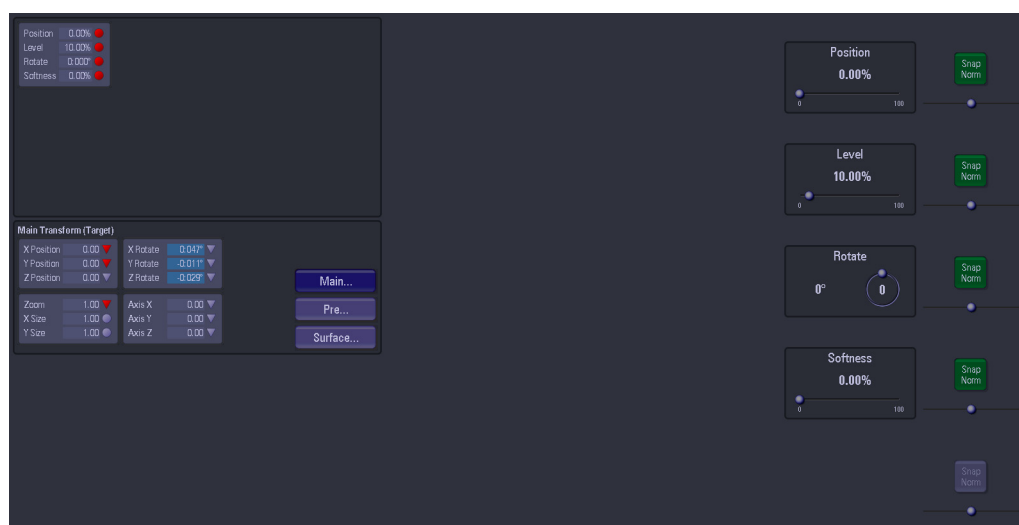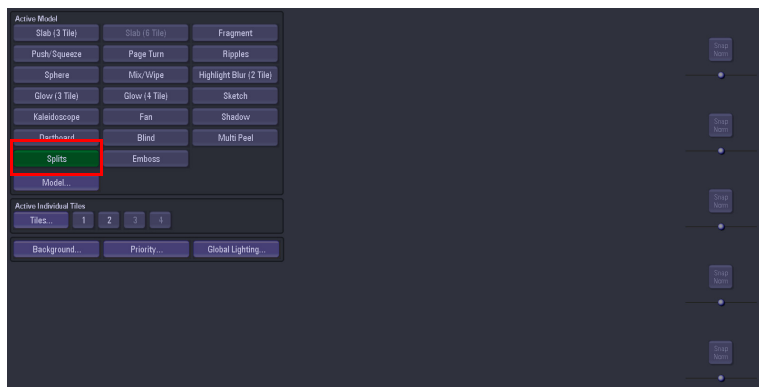
Position - moves the two section of the tile apart, i.e., even strips in one direction and odd strips in the opposite direction.
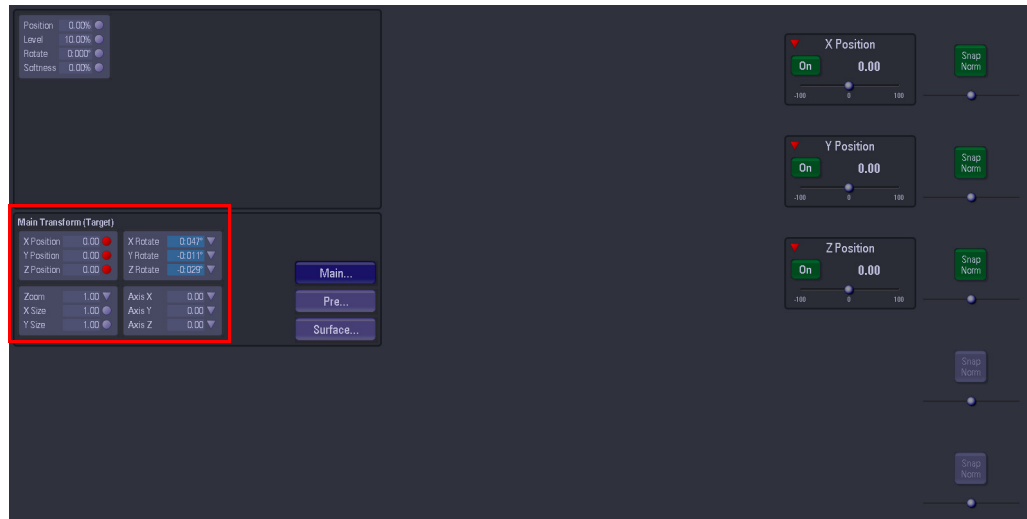
Level - sets the number of strips.

Rotation - sets the direction of the strips.

Softness - softens the edges of each strip.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the model on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the model around the center of the axis

Zoom - will zoom the model up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

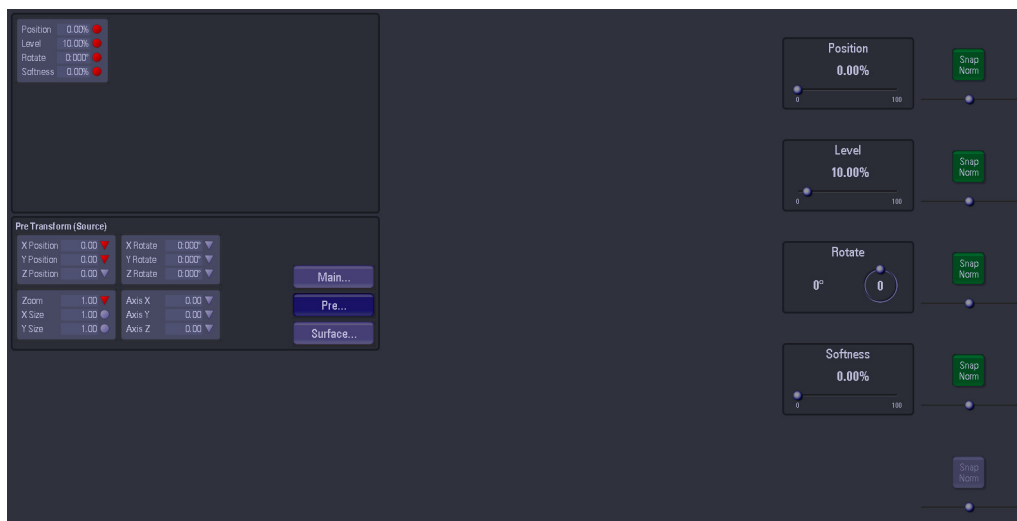**X Rotate** - rotates the model such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the model clockwise/counter-clockwise

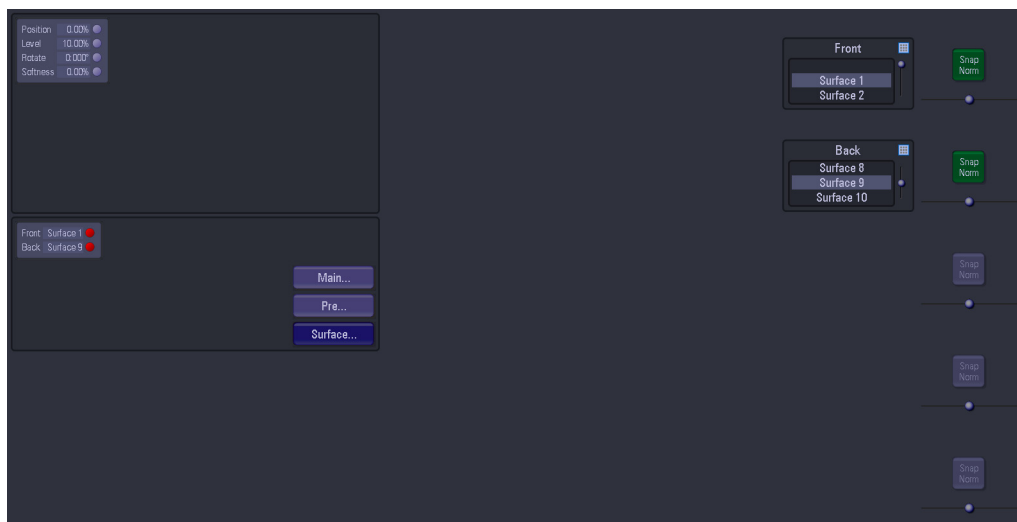**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected model "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze model, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.
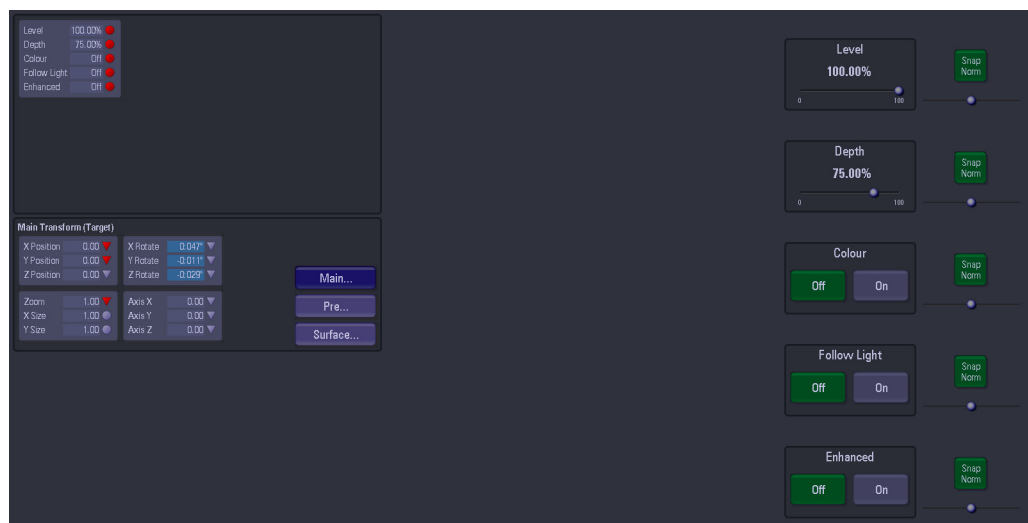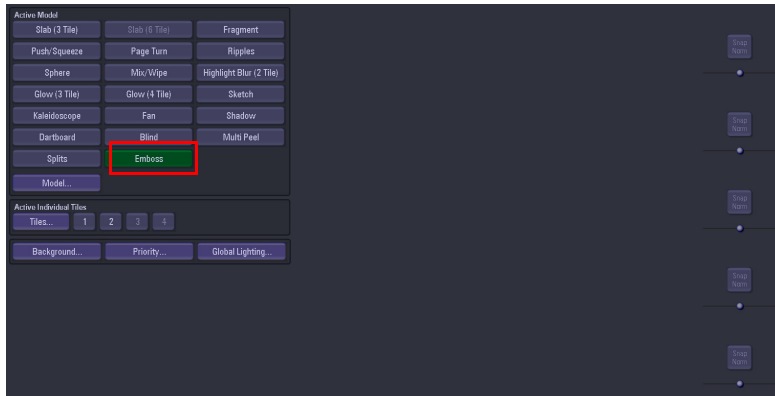
Surface Parameters

Front Surface - selects the source for the front surface of the model

Back Surface - selects the source for the back surface of the model

DVE Model - Emboss

Emboss gives the effect of pressing the source subject into the surface of the DVE tile, makes the source look like a raised design.

DVE Emboss gives the effect of a raised design

Level - sets the emboss level of the DVE model, 0% the DVE tile is normal, 100% is full embossing effect of the tile.

Depth - sets the depth of the emboss and enhance the effect of the raised lines.
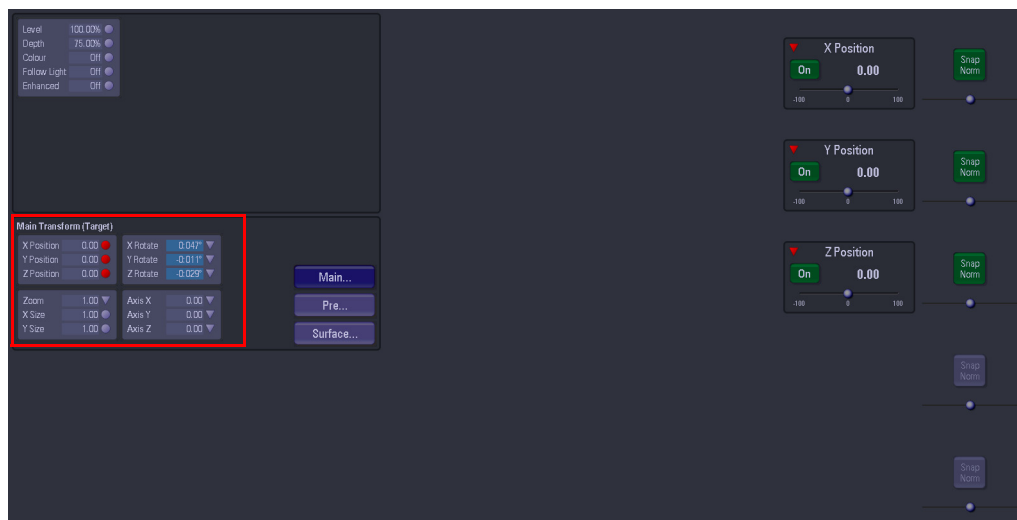
Color - will turn On/Off any color that is in the source.

Follow Light - will raise the luminance level of the source

Enhanced - will enhance or sharpen the source.

Main Transform (Target)

This menu is the Main Transform (Target) menu, which sets the position of the model on screen around its own center point. The menu also moves the tile "Globally" around a central point using the Axis parameters, the tile can be moved away from the central point but will always move around that point, think of it as the Earth being the tile moving around the Sun, the tile can be moved away but will always move around the central point in space by the parameter controls.

X, Y, Z Position - will move the position of the model around the center of the axis

Zoom - will zoom the model up or down

X, Y Size - will change the physical shape of the tile horizontally or vertically

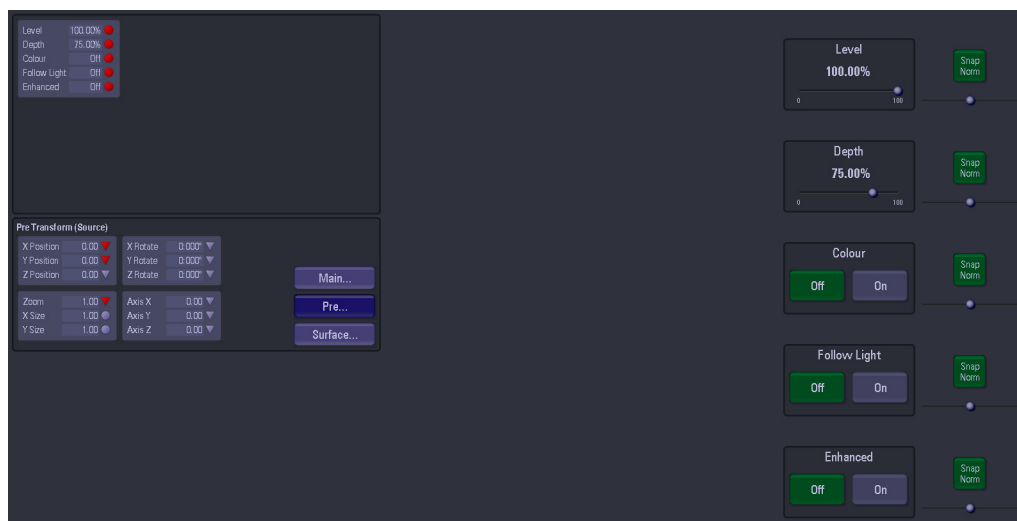**X Rotate** - rotates the model such that the left and right sides turn into the screen

Y Rotate - rotates the top and bottom into the screen

Z Rotate - rotates the model clockwise/counter-clockwise

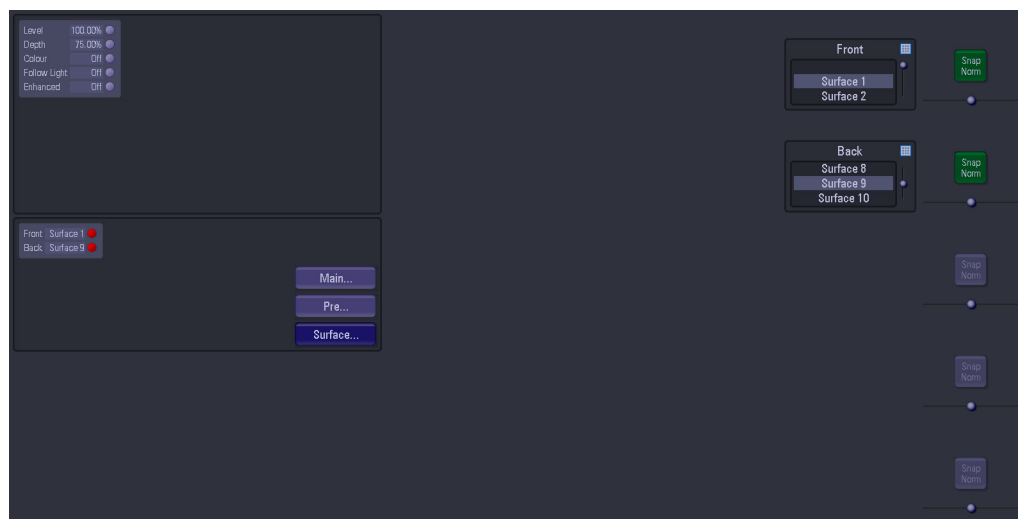**Axis X, Y, Z** - moves the central axis point around

Pre Transform (Source)

This menu is the Pre Transform (Source) menu, which moves the selected model "Locally" around its own central point, the tile can be moved away from the Main Transform (Target) central point but will always move around its own axis, again, think of it as the Earth being the push/squeeze model, spinning around its own axis but can be moved away from the Sun, by the parameter controls.

This menu has all the same adjustments as the Main Transform (Target) parameters.
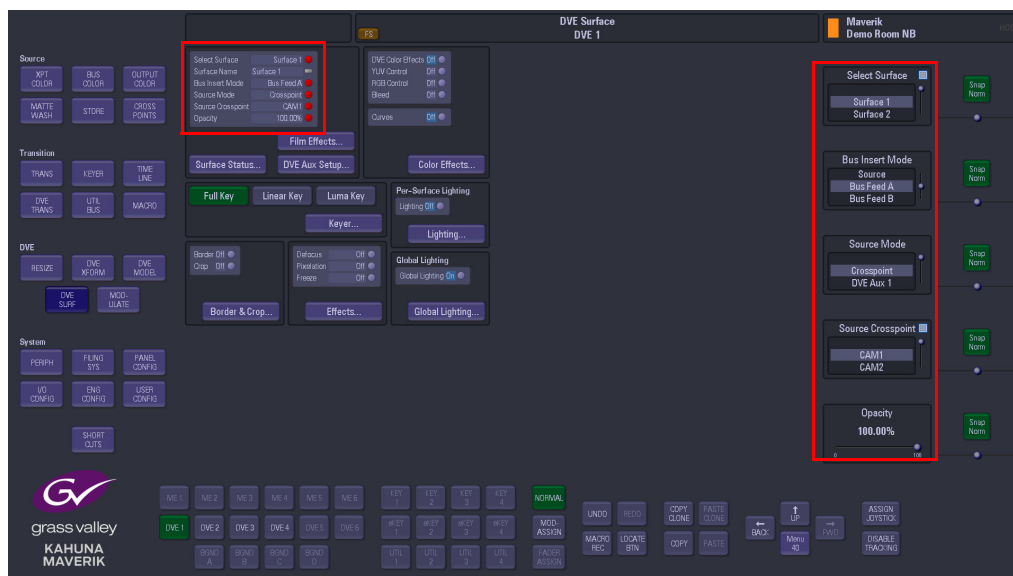
Surface Parameters

Front Surface - selects the source for the front surface of the model

Back Surface - selects the source for the back surface of the model

DVE Surfaces

One of the primary function for the DVE Surfaces menu is to setup Sources for the Tile Surface, tiles have 2 surfaces a **Front Surface** and a **Back Surface** and the DVE Surfaces menu is where the sources are set up for each tile surface. The Tiles are also used to create the DVE Models such as Slab Model and Page Turn Model, so any adjustment made in any of the DVE Surface menus will affect the type of DVE being used at the time, for example if a Slab Model is being used, 3 Tiles that make up the sides of the slab are visible at any one time, any adjustments to the surfaces of the tiles in these menus will affect the slab.

The other functionality here is to add color effects, Keying effects and Borders.

In a Source based DVE the user allocates sources for the DVE tile surfaces using the **Source Mode** and **Source Crosspoint** parameters as shown above. Remembering that the DVE tiles have 2 surfaces (front and back), this will mean that if all 4 tiles are being used, up to 8 surfaces may need different sources.
Use the **Selected Surface** parameter to select the required surface, set the **Bus Insert Mode** parameter to **Source** and use the **Source Mode** parameter to select the source for that surface, it is as simple as that.

DVE Aux Setup

The user also has the choice of using a **DVE Aux Bus** as a source for a tile surface. Use the **DVE Aux Bus** parameter to select Aux 1 - 16 and then use the **DVE Aux Setup** menu to select the source for the tile surface.
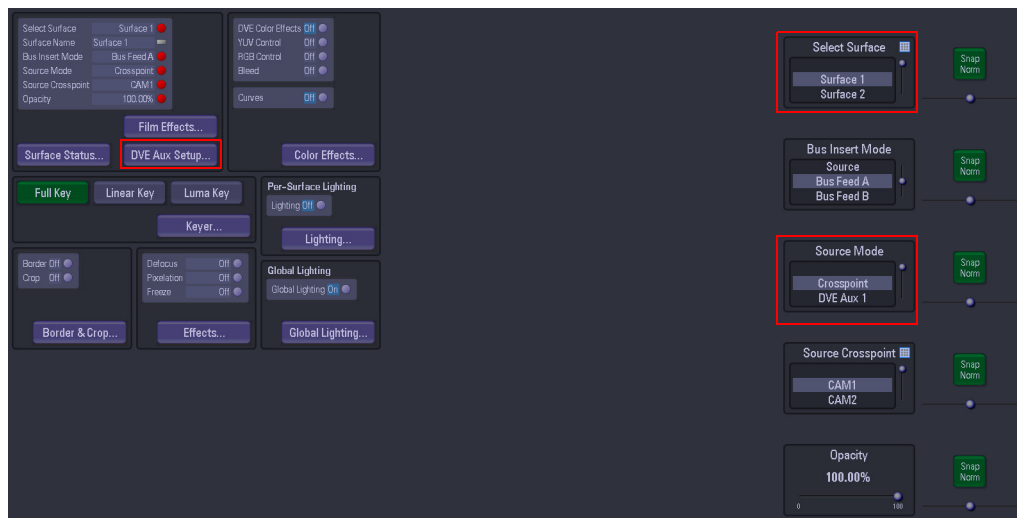

Select the **Surface** that the DVE Aux will feed using the **Select Surface** parameter, then using the **Bus Insert Mode** parameter, select the **Source** option, this will allow the DVE Auxes to be selected to feed the surfaces of the Tiles or DVE Models.
Press the **{DVE Aux Setup...}** button.
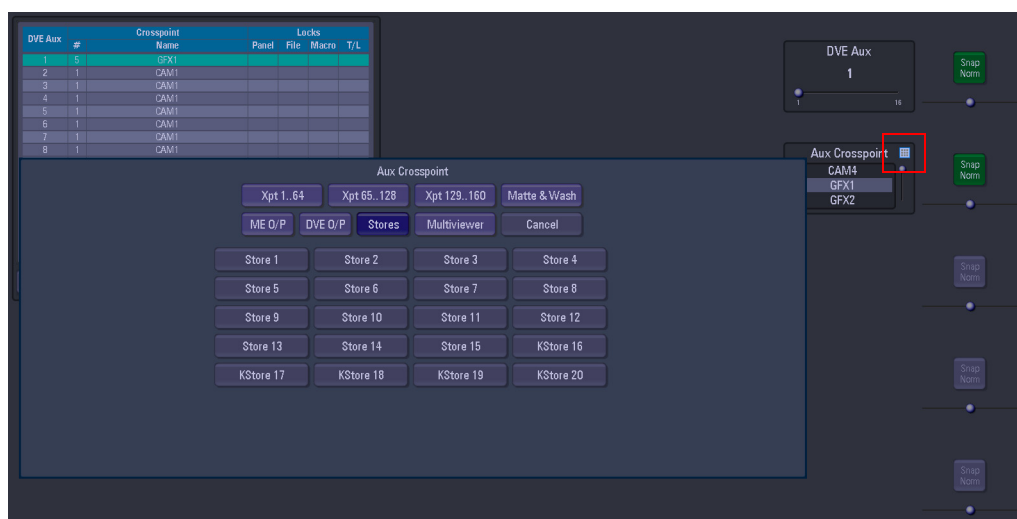
Use the **DVE Aux** parameter to select a DVE Aux, then select a Source for the DVE Aux using the **Aux Crosspoint** parameter, this allows the user to select a source from Xpts, Mattes, Washes M/E outputs, DVE outputs or Stores.

> Note: Use the popup selector to quickly select a source for the selected DVE Aux.
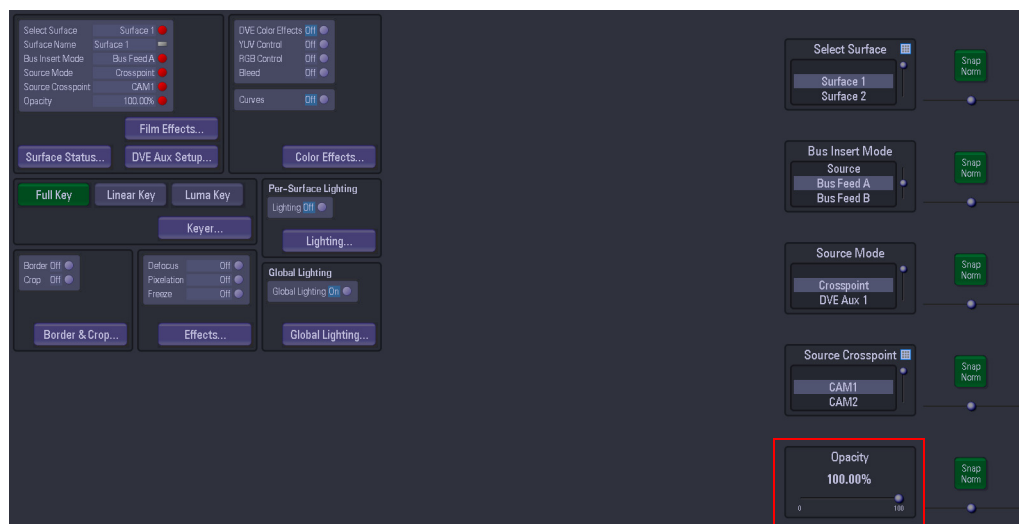
The **Opacity** parameter will adjust the opacity of any Tile or Model that is currently being used or setup.
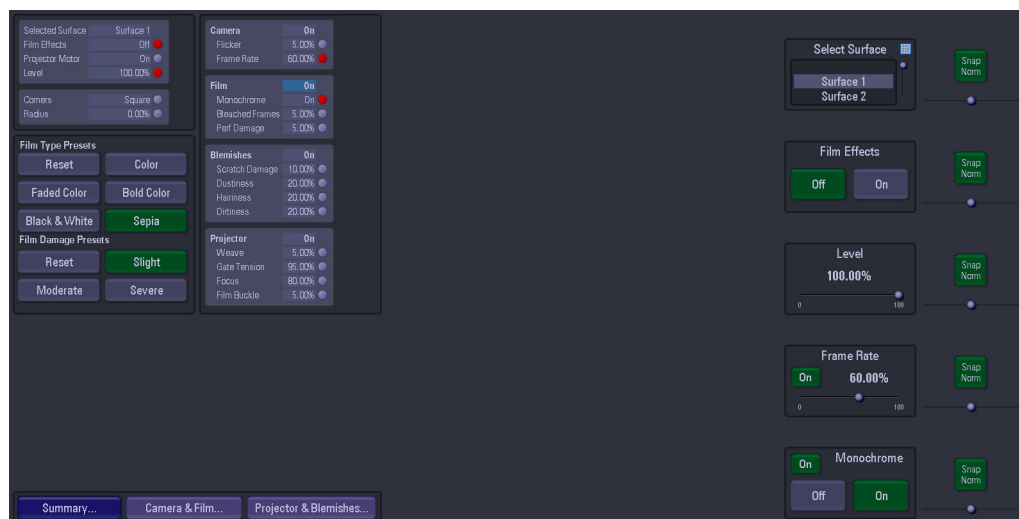
Film Effects

Film Effects is a DVE Tile or Model surface effect that allows DVE surfaces to have different types of "Film Effects" applied to them. Film effects would be used for example to make a new piece of video footage look old and damaged.
Film Effects can be used on any of the 3D DVE Effects models, such as Tiles, Slab and Sphere etc. Effects such as a Faded Color, Sepia and Black and White, all with different types of Film Damage, Blemishes, Scratches, Dirt, Hair, Projector and Camera Damage.
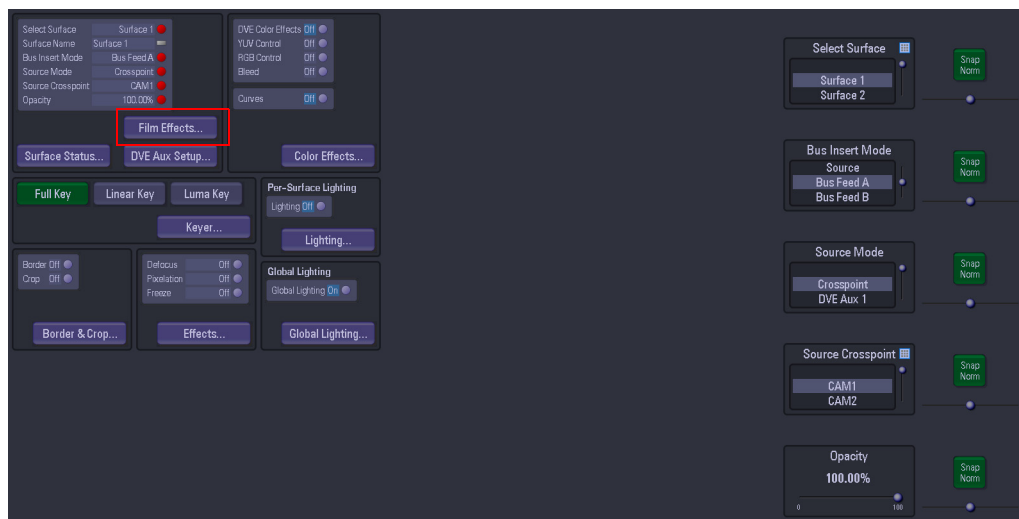
To use Film Effects, make sure that the chosen DVE model is setup as required, then press the **{Film Effects…}** button, the Film Effects (Summary) menu will then appear, in this menu press the Film Effects {On} button and preset default film effect should then be seen on the DVE Output.

The above **Film Effects (Summary)** menu is used to quickly access some of the available film effects using the Presets options and the basic Camera, Film, Blemish and Projector parameters. Each surface for the DVE model can also be selected from here.

The **Monochrome** parameter can be manually switched On/Off, but will be set depending on the **Film Type Preset** selected
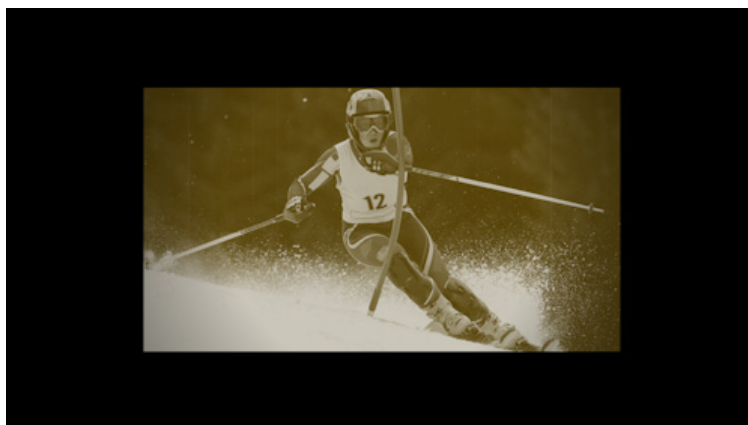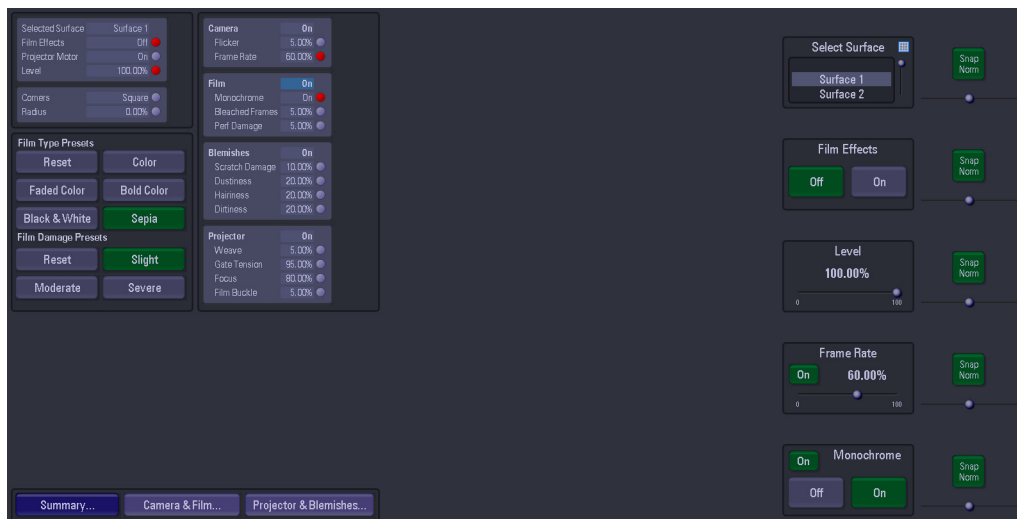
DVE Tile with Default Sepia Effect applied

The film effect level is adjusted using the **Level** parameter control, this will adjust the amount of film effect added to a surface, so at 0% the surface will be displayed normally with no effect visible, at 100% which is the default value the surface will have the full film effect added, as shown on the next page.
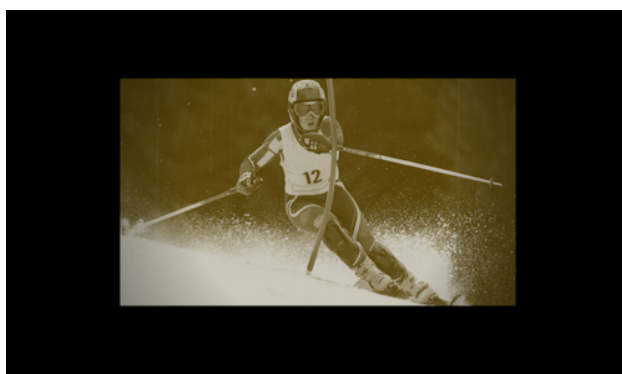
Reference DVE Tile set at 0% Level
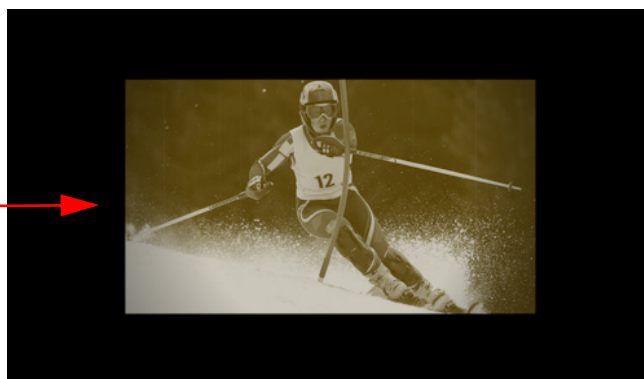
Sepia DVE Tile set at 100% Level

The user is able to quickly select the type of film effect to add to the DVE surface using the Film Type Presets buttons, this will apply the type of color effect needed, as shown below:
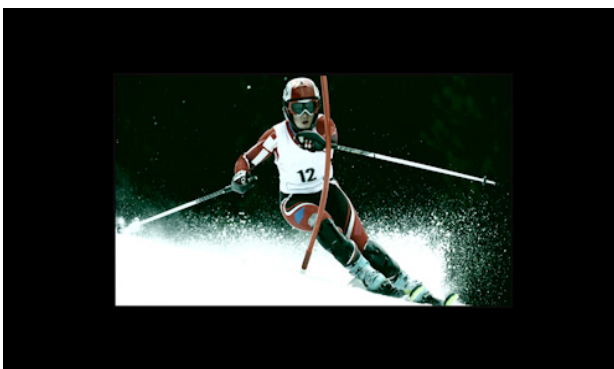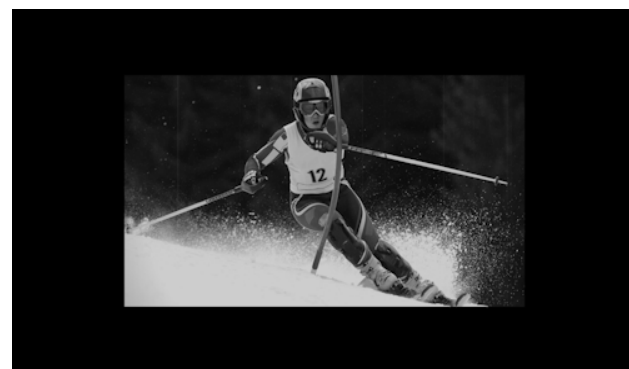

Color Preset

Sepia Preset

Faded Color Preset

Bold Color Preset

Black & White Preset

Curved corners can be added to a DVE tile using the parameters in the above menu. Change the corners of the tile by touching the {Curved} button, then adjust the "Radius" of the corner.

The Film Damage Presets will add film effects such as scratches, projector weave, dirtiness and flicker to the DVE surface. The severity of the damage is selected using the preset buttons.
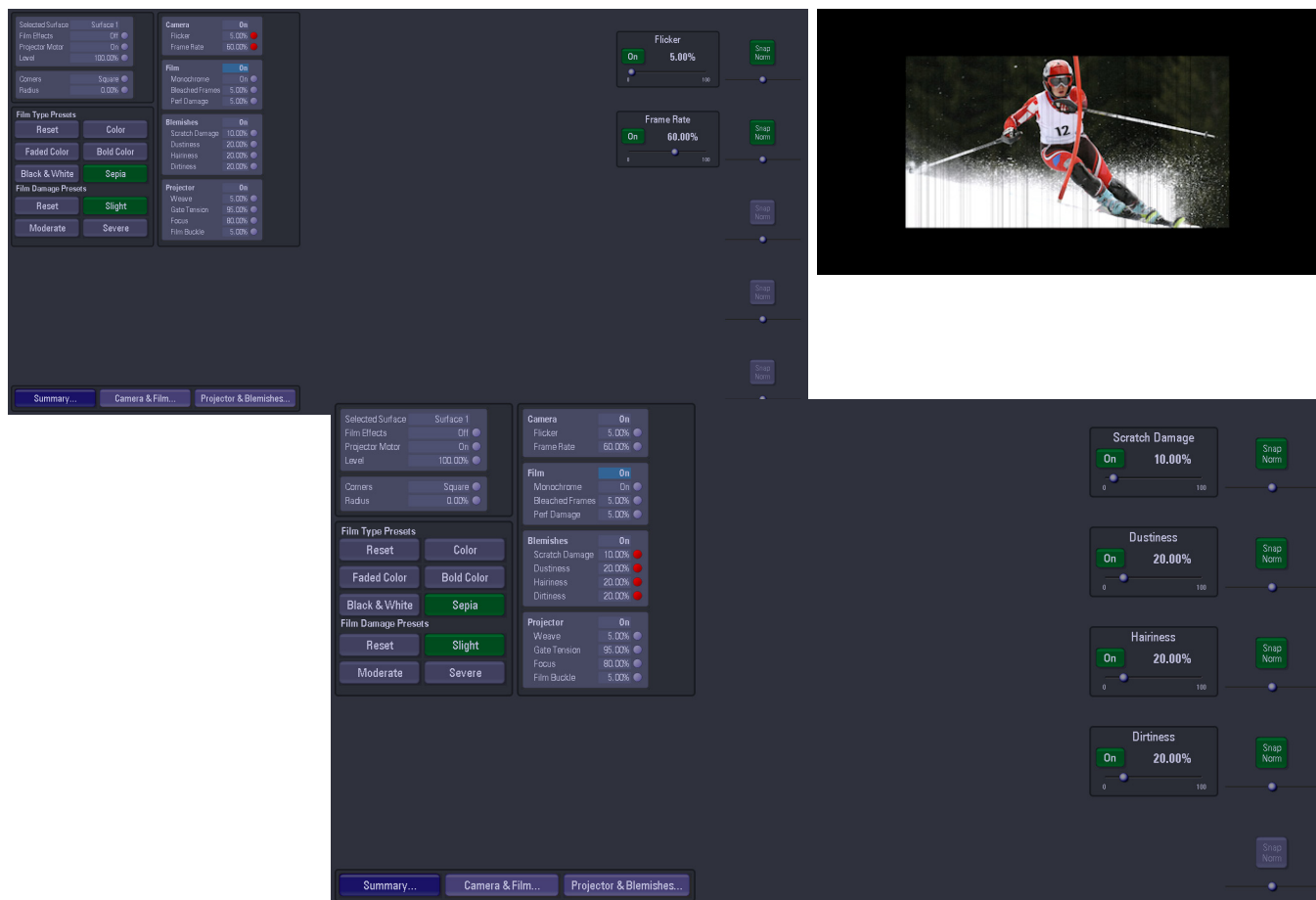
Another feature in this menu, allows the user to add further damage adjustment to a DVE surface using the attachers shown in the center of the menu below, once the attacher is activated, the parameter controls can be adjusted to add more scratch damage, flicker etc.

Camera & Film

This menu allows the user to include Camera and Film distortion effects to a DVE surface. The first set of controls and parameters in this menu turn the film effects menu On/Off and also enable the "primary" effect which is the Projector Motor.
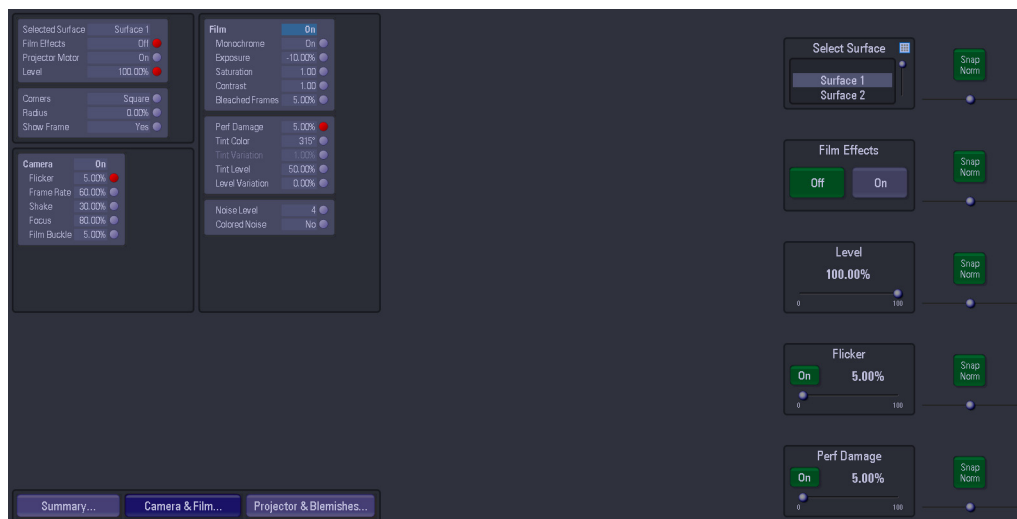
Camera - this control give the effect of film footage taken by an 8mm hand held Cine camera.

Flicker - this randomly varies the brightness (exposure) of each frame

Frame Rate - this simulates slower frame-rate film, at 100% the effect causes the film to run at current standard (i.e. no effect). 0% causes the film rate to run slowly.

Shake - this simulates camera shake and randomly drifts the contents of the tile in an X and Y direction without actually moving the tile.

Focus - this simulates adjustment of the lens focus on the camera

Film Buckle - this simulates film buckling in the camera mechanism, causing loss of focus and the film having extra jumping effect.
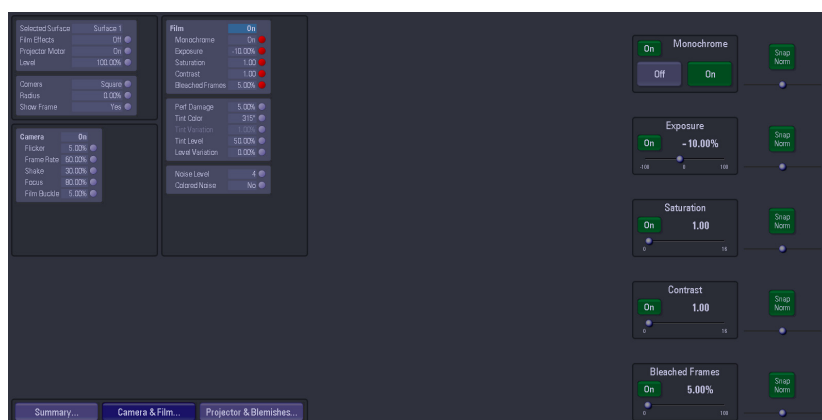
Film - Switches on/off the 'film' contribution to the film effects.

Monochrome - discards any color in the surface film or picture

Exposure - Brightens or darkens the film or picture

Saturation - Increases or decreases the amount of color in the surface film or picture

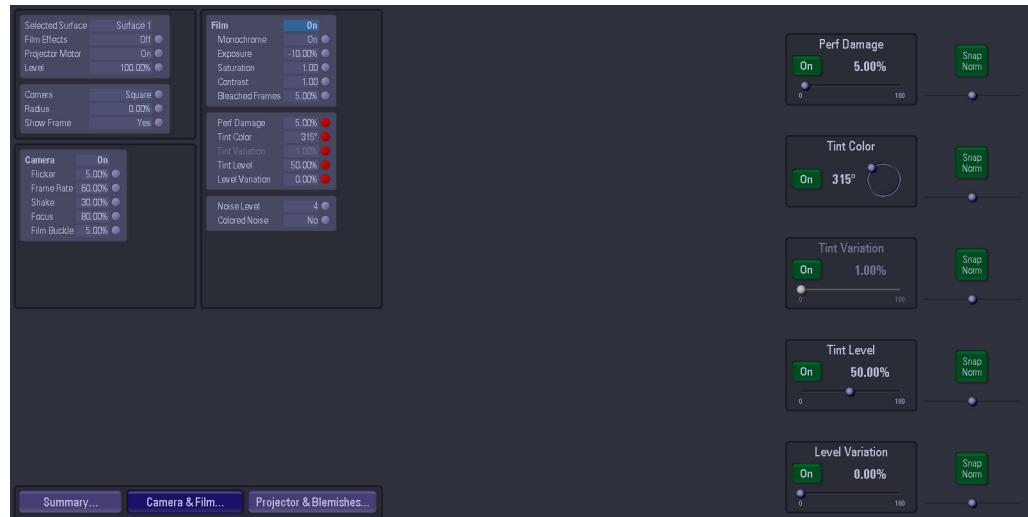**Contrast** - or decreases the amount of contrast in the surface film or picture

Bleached Frames - Randomly drifts in and out a washed-out look to the surface film or picture

Perf Damage - Simulates occasional frames that are still in motion in the camera/projection during exposure, as if their sprocket holes (perforations) are damaged

Tint Color - Sets a color for tinting the film, when adjusting the parameter, this will make the surface film or picture look more Red or Blue or Green.

Tint Variation - this will adjust how much the selected color will vary randomly

Tint Level - Controls how much tint is added to the surface film or picture.
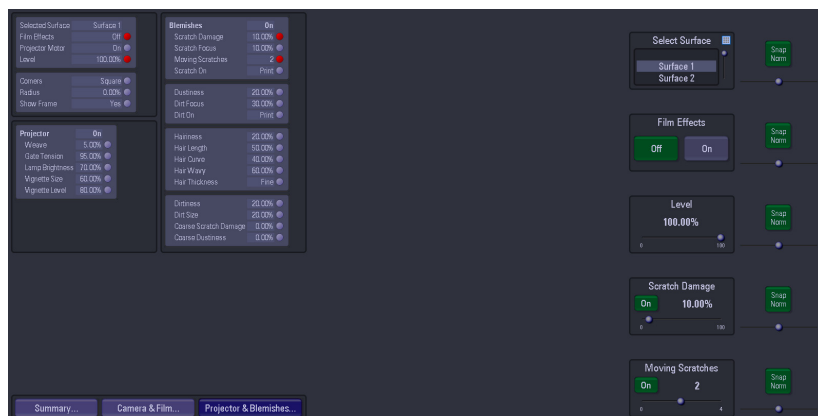
Level Variation - Sets how the tint level will randomly vary

Film Effects - continued

Noise Level - Adds a film-like "white noise" to the picture

Colored Noise - this adjusts the amount of colored noise there is in the noise level.

Projector & Blemishes

This menu will allow the user to add physical film damage effects to a DVE surface.

The first set of controls and parameters in this menu enable the "primary" effect which is the Projector Motor.

Level - this control will allow the smooth transition between no film effect and full film effect.

Projector - this turns the Projector contribution of the film effect On/Off

Weave - this simulates film weaving from side-to-side in the gate of the projector, this actually moves the DVE tile around, and locks the picture to the tile.

Gate Tension - this controls the tension of the film gate in the projector and can be used to cause a vertical jump. 100% means the film is properly clamped in the gate. 0% is a loose gate where each frame has stopped in a slightly different place.

Lamp Brightness - this controls the brightness of the lamp. 100% shows the picture at the correct brightness, as the parameter is adjusted towards 0% the picture on the tile will dim.

Vignette Size - this controls how far into the frame the light fall-off begins, when simulating dark edges/corners of the picture due to a poor lens.

Vignette Level - this controls how dark the corners/edges of the film will become.
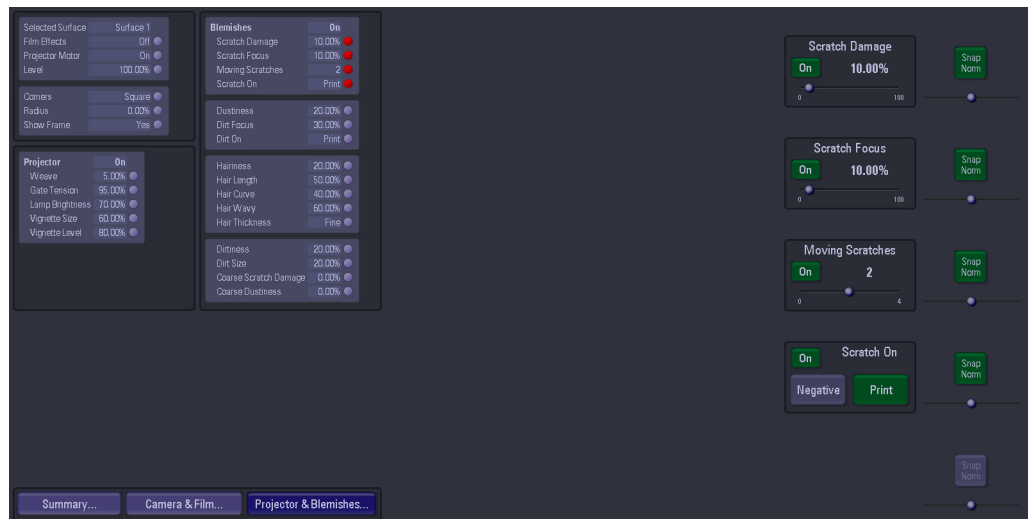
Blemishes - this turns the blemishes contribution to the film effects On/Off

Scratch Damage - Sets how badly scratched the film is (on average). Actual scratch level will wander randomly around when setting the parameter level.

Scratch Focus - this controls the opacity of the scratches.

Moving Scratches - Up to 4 'special' scratches can be added. These persist for a random number of seconds and will move around randomly.

Scratch On - Scratches can be present either on the original Negative (dark scratches) or on the Print (white scratches).

Dustiness - The dust level will wander randomly about this level.

Dirt Focus - Controls the opacity of the dirt level on the DVE surface.

Dirt On - Dirt can be present on the tile, either on the original Negative (white blobs) or on the Print (dark blobs).

Hairiness - will add simulated random hairs to the film effect

Hair Length - lengthens and shortens the hairs

Hair Curve - curls the hair around in a circle

Hair Wavy - simulates wavy hair on the film effect

Hair Thickness - changes the hair from Fine to Thick

Dirtiness - The dirt level will wander randomly about this level.

**Dirt Size** - increases the size of the dust particles.

Coarse Scratch Control - extreme version of Scratch Damage, this is able to be smoothly transitioned in or out. 100% is gives near-total coverage of Scratch levels.

Coarse Dustiness - extreme version of Dustiness, this is able to be smoothly transitioned in or out. 100% is gives near-total coverage of Dust levels.

Color Effects

This allows the user to adjust the color of the selected DVE tile or model, there are a range of adjustments and effects that can be applied.
The main color adjustment parameters are the same color effects that are used in the Color Correction menus throughout Kahuna.
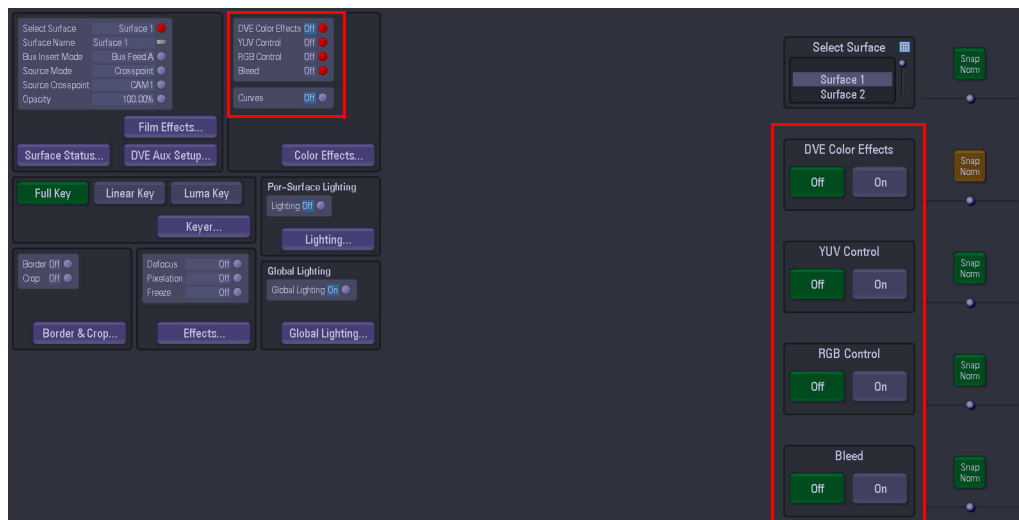
To start using the DVE Color Effects, press the **{On}** button for all the color controls, then press the **{Color Effects}** button.

The color correction part of the menu allows the user to change the color balance on each individual DVE sources, there are 4 types of control, YUV, RGB, Bleed and Preset.

To use the color correction options, press the **{Color Correction}** button in the main menu and the button will go Green.
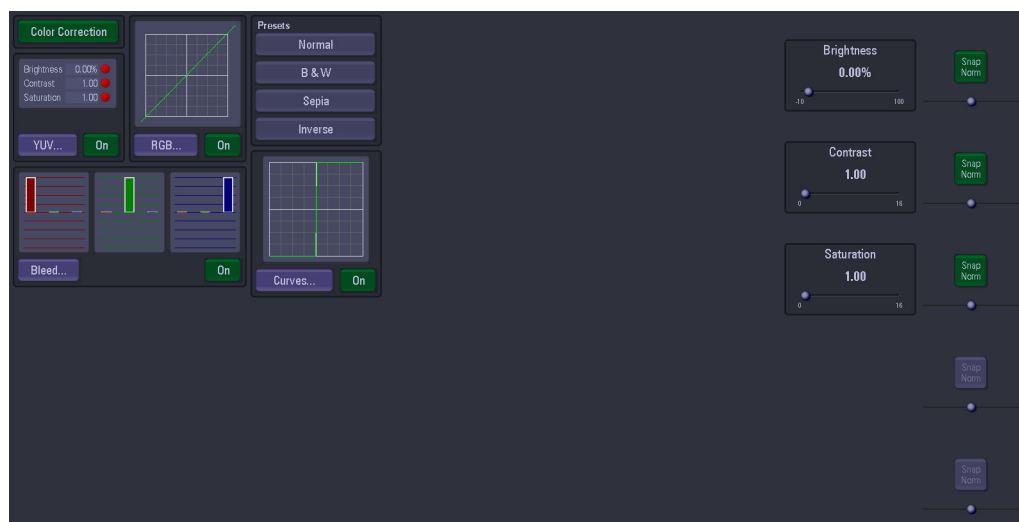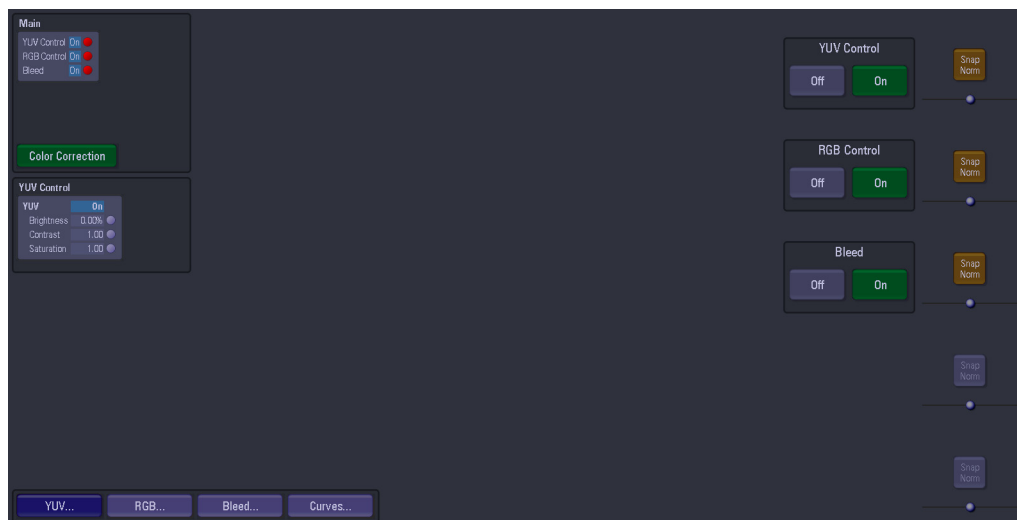

The basic controls of **Brightness**, **Contrast** and **Saturation** can now be adjusted using the parameter controls.
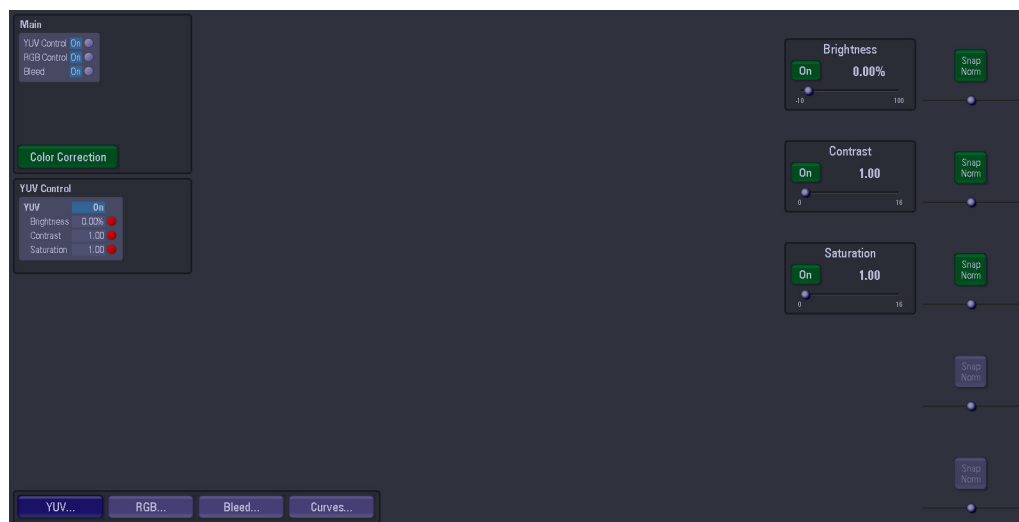
DVE Surface - YUV

Press the **{YUV...}** button to enter the **DVE Surface - YUV** menu.
The **Main** attacher displays the On/Off status of the YUV Control, RGB Control and the Bleed Control.

If the **Color Correction** button is turned Off (button is Gray) then all the color adjustments made will be turned Off; but not lost, they will all become active again when the Color Correction button is turned On.

Touch the **YUV Control** attacher and by changing the parameters, the Brightness, Contrast and Saturation can be adjusted.
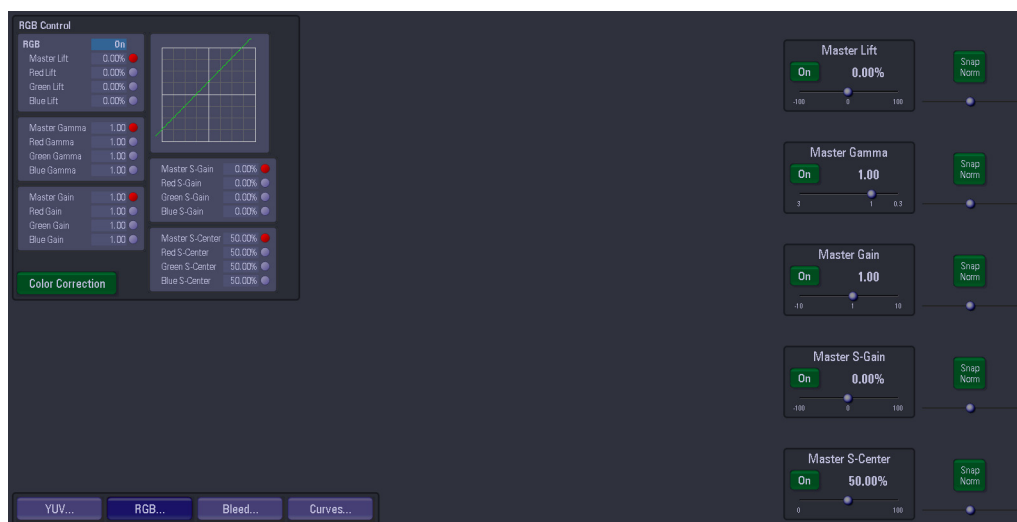

- Brightness default value is 0.00%, and the range is from -10% to 100%
- Contrast default value is 1.00%, and the range is from -0% to 16%
- Saturation default value is 1.00%, and the range is from -0% to 16%

As each of the above are adjusted notice that the parameters in the YUV Control menu turn Orange and the percentage of adjustment is shown.

DVE Surface - RGB

Press the **{RGB...}** menu button to enter the **DVE Surface - RGB** menu.

The initial menu is set to a default condition, which shows all five Master adjustment parameters highlighted by the Red active circles. This will give an adjustment of Master Lift, Gamma, Gain, S-Gain and S-Center. Each of these adjustments will alter all three elements of the RGB signal at the same time.
When one of the master parameters is altered, notice that the RGB curve profile changes in the graph situated center of the menu.

Touching one of the attachers allows a more accurate adjustment to the RGB components where the:

Lift - parameters adjust the images Black Level, working on Black or shadow areas. Gamma - parameters adjust the levels between dark/shadow and the mid tones, where the mid tones become brighter or darker; depending on the adjustment made.

Gain - parameters control the White Level or highlights, where brighter colors become brighter or darker; depending on the adjustment made.

S Gain and S Center - the parameters adjust the gain mid tone levels of the S curve and the center point levels of the s curve.

DVE Surface - Bleed

Color bleed is a situation where a single color will over power the other colors in the RGB signal. By using the bleed function the stronger color can be softened to make the color output more natural, or adjusted to suit a specific need.

Again make sure the Source Correction is turned on.

The initial menu has a default state where a single adjustment for each parameter menu is active; this will allow the adjustment of the main RGB bleed parameters:

- Red into Red
- Green into Green
- Blue into Blue

Touch one of the attachers to enable all the options in that menu, this will allow a detailed adjustment for each of the R, G and B bleed settings. The adjustments are measured on a -100% to a +100% scale. Each parameter menu will adjust a single color, i.e. red into red, green into red and blue into red. These changes are also reflected graphically in the RGB bar graphs above the parameter sets.

DVE Surface - Curves

This function is used to add artistic type effects to a DVE surface such as Solarize and Posterize, and also allows the user to setup user defined effects.
To use Curves the option has to be turned On in the DVE Surfaces main menu as shown below, then enter the Color Effects menu and press the Curves menu link button.
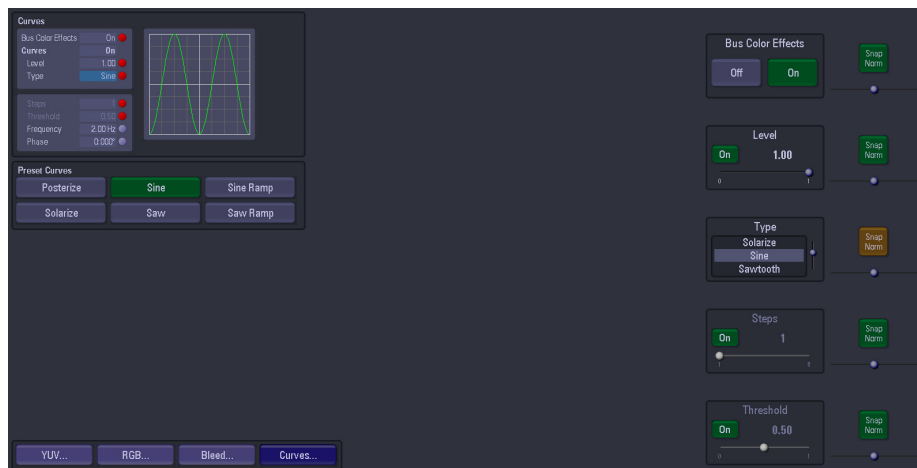
DVE Tile with Posterize Effect

The user can select from 6 Preset Curve options or use the Type parameter to select from a list of options. To use the Curves choose the type of effect required, once selected, the user can then manipulate the effect using the parameter controls.

Level - changes the level of effect on the selected surface, from a normal looking still/clip to an extreme manipulation effect.
Type - as mentioned above selects the type of effect.
Steps - the more steps there are in an effect, the less extreme the effect.
Threshold - adjusts the light and dark portions of the source
Frequency - only works with certain functions, and determines how often the Steps are applied to the effect
Phase - adjusts the effect starting point within the Step cycle
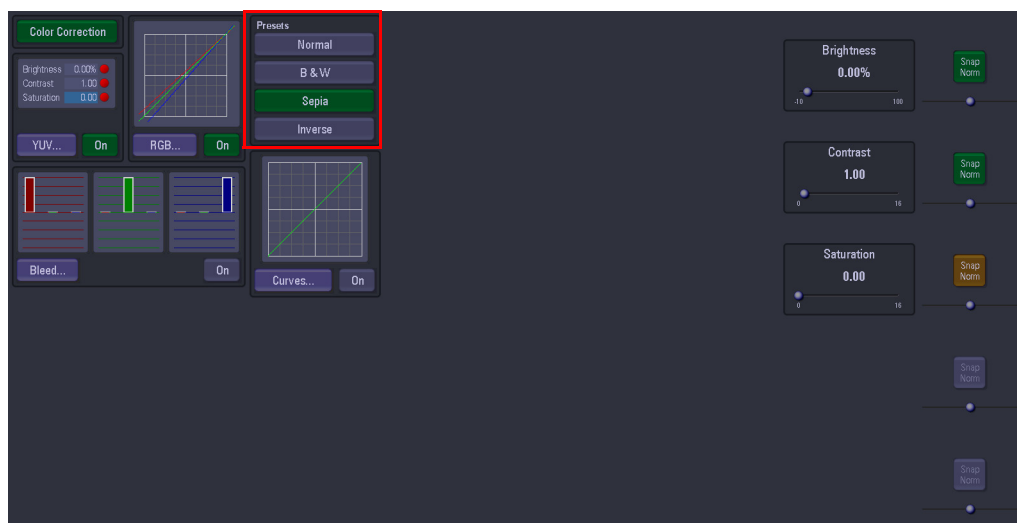
Sine Effect

Solarize Effect

DVE Color Effects - Presets

Presets allow the user to quickly select commonly used preset color options for the crosspoint source, or quickly revert back to the original crosspoint source color levels.

Normal - is the original color levels of the DVE source; without any color correction adjustments.

B & W - sets the chroma saturation to zero removing the chroma content, making the signal black and white.

Sepia - sets the chroma saturation to zero removing the chroma content, then adds positive portions of Red and Green and a negative portion of Blue to make-up a sepia appearance.

Inverse - Inverts the video signal making the picture a negative of its correct colors.

If the **Normal** preset option is selected, then all color correction controls are Grayed out preventing any adjustments. This is to make sure that the original DVE source can be recalled.

If **B&W**, **Sepia** and **Inverse** are selected, the preset levels can all be color corrected.

DVE Surface - Keyer

This menu sets up the Keyed source for a DVE surface and works much like some of the Keyer functions in the Key Control area on the control surface. This menu allows a key adjustment to be applied to a single surface in the Source/Pre-Transform.
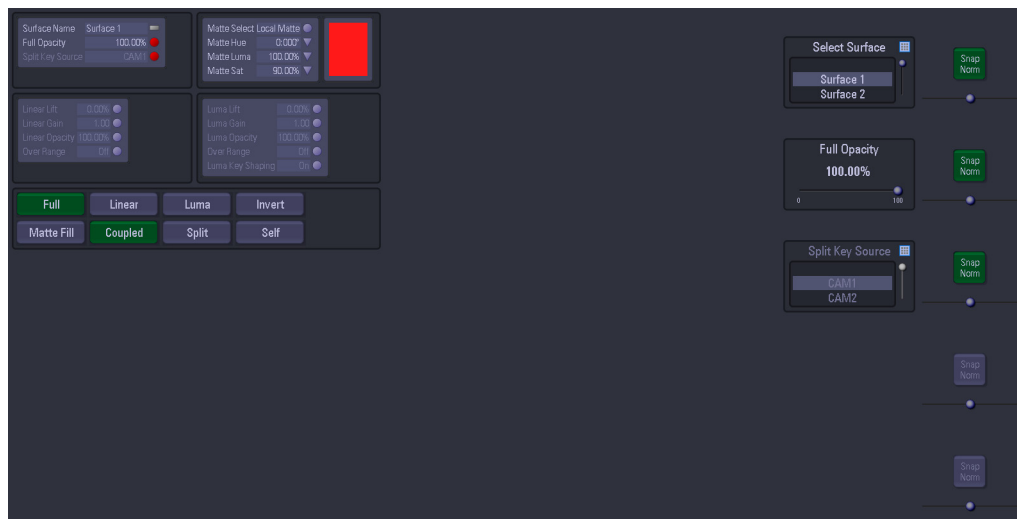
Selected Surface - the selected surface that will have the Keyed source added

Linear and Luma Parameters

Lift - sets the Luma and Linear level at which the Key operates.

Gain - affects the sharpness of the lift point.

Opacity - controls how transparent the Key is.

Shaping - stops dark edges appearing around a Keyed source (anti-aliasing).

When using sources that are not pre-Keyed, such as those from a camera, the Key cut signal is generated from the video signal using lift and gain controls. The portions of the signal that are greater in luminance than the lift level cut the hole in the background.

{Full} - the Fill is a full layer over the Background hiding it completely

{Linear} - linear Key (a pre cut Key)

{Luma} - Luminance Key (no pre-keying has been applied to the fill)

{Invert} - Inverts the keying signal

{Matte Fill} - Sets Matte for the selected Key layer as that layers fill

{Coupled} - Sets the Key source as that selected on the bus crosspoint

{Split Key} - Allows the fill and cut signals to be separated. The fill signal is selected as normal. To split the cut signal, press this button and select the cut signal on the Key crosspoint bus. With this button pressed the bus displays the cut source and with it released the fill source is displayed.

{Self} - Sets the Key cut source as that selected on the Key i.e., a Luma self Key.

DVE Surface - Border and Crop

Press the **{Border & Crop…}** menu link button. In this menu borders can be applied to surfaces and the edges of surfaces can be cropped, borders are selected from pre-defined Mattes and user defined Local Mattes.
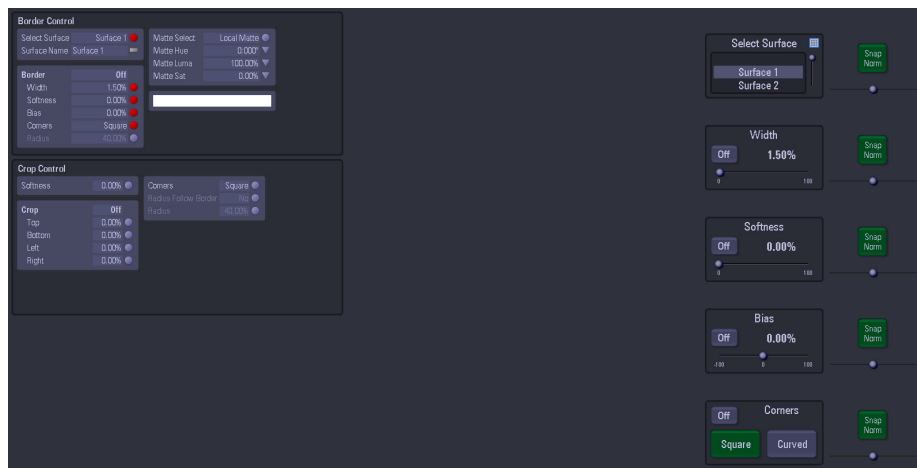
DVE Tile with Border

DVE Tile with Soft outside Edge Border

DVE Tile with Corners on the Border and Crop

Border On/ Crop On

Touch this attacher to enable the Border and Crop On/Off parameters.

Select Surface - the selected surface that will have the Border/Crop added
Surface Name - allows the user to give the surface a user defined name
Border - On/Off selection for the border option, turned On/Off by the touch buttons in the parameter options.

Width - border width
Softness - softness of the edge of the border
Bias - used to move the softness from inside edge through to the outside edge of the border.
Corners - this selects between Square corners and Curved corners option.
Radius - this will adjust the radius of the curve in the corners of the boarder, when the Corners parameter is set to Curve 0% will have a very slight radius curve in the corner, 100% will have the most exaggerated radius.

Matte Select - selects one of available Mattes or a Local Matte, which can be adjusted by the parameters in this menu.

Matte Hue - sets the actual Matte color, the parameter control operates a 360 degree color wheel where:

0 = Red

60 = Yellow

120 = Green

180 = Cyan

240 = Blue

300 = Magenta

Matte Luma - sets the Luminance or brightness control that affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no luminance or Black and 100% is maximum brightness.

Matte Sat - The saturation control affects the selected Matte Hue, the parameter adjusts from 0 to 100% where 0% is no saturation or no color i.e. only shades of Gray and 100% is fully saturated or maximum color.Crop Control Parameters

**Softness** - softens the leading edge of the crop

Crop - On/Off selection for the crop option, turned On/Off by the touch buttons in the parameter controls.

Top, Bottom, Left, Right - selects the edge of the surface that will be cropped, the crop feature also allows the DVE Crop parameters to be adjusted negatively (Under Crop) allowing the edge of the DVE tile to be expanded outwards. Under cropping will reveal repeated pixels and lines from the edges of the picture.

DVE Surface Effects - Defocus, Pixelation and Freeze
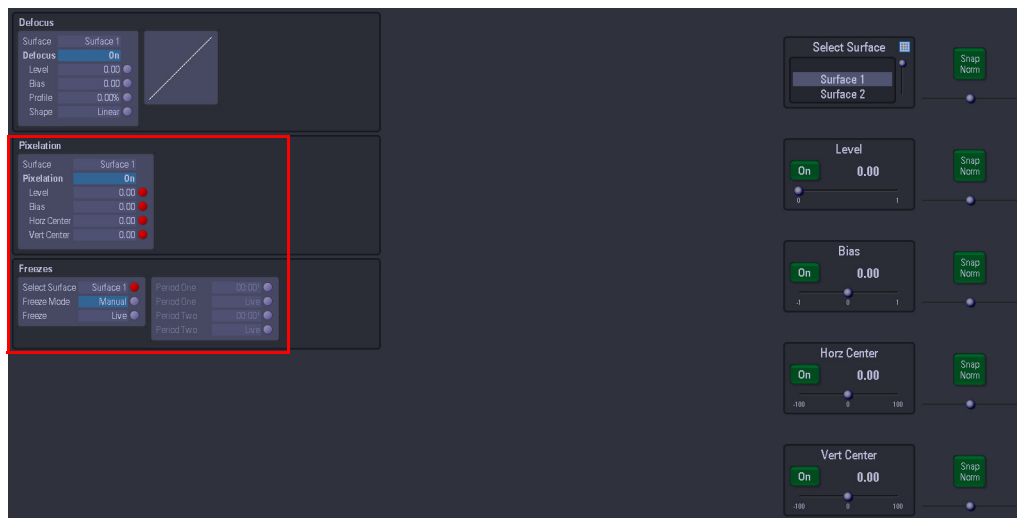
Defocus
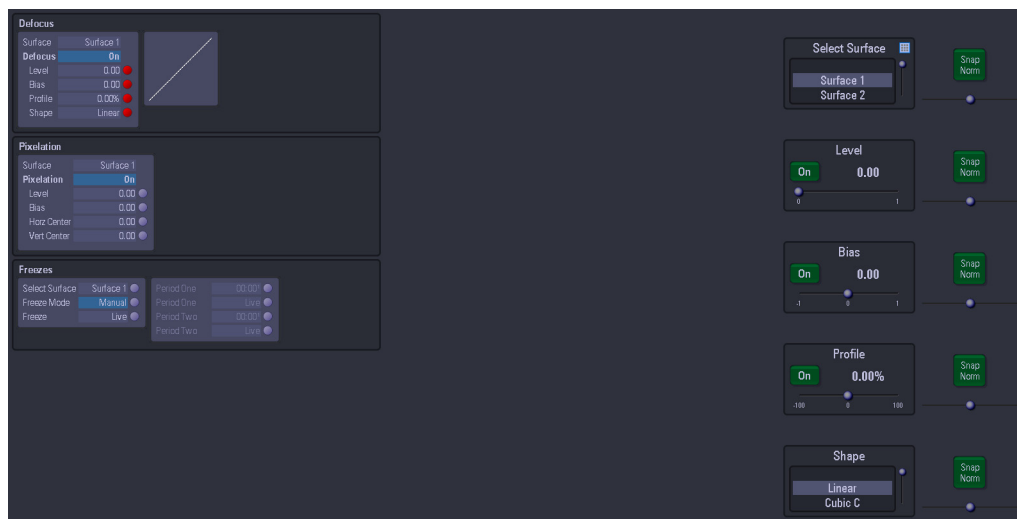
Surface - the selected surface that Defocus will be applied to.

Defocus - On/Off selection for the Defocus option, turned On/Off by the touch buttons in the parameter options.

**Level** - applies and adjusts the amount of Defocus to a source, 100% is maximum Defocus

Bias - once the source has been defocused, this parameter applies the defocus on a horizontal or vertical axis, 0% sets the defocus evenly across the source, -100% sets the defocus to "streak" horizontally across the source, +100% sets the defocus to "streak" vertically on the source.

Profile - This modifies the non-linearity of the Defocus Amount control.
The curve profile can only be used to change the Cubic S/Sin S and Cubic Curve/Sin Curve profiles, which are selected using the Shape parameter control. The Linear profile cannot be adjusted.

Shape - selecting one of the Shape options will depict the type of profile curve; this will alter the defocus rate. The shapes include:

- **Linear** - defocus at an even rate
- **Cubic C and Sin C** - these profiles are similar to each other, the default defocus transition will have a fast acceleration at the start and slowdown towards the end.
- **Cubic Curve and Sin Curve** - these profiles are also similar to each other, these will accelerate at the start slow down towards the mid point and accelerate again.
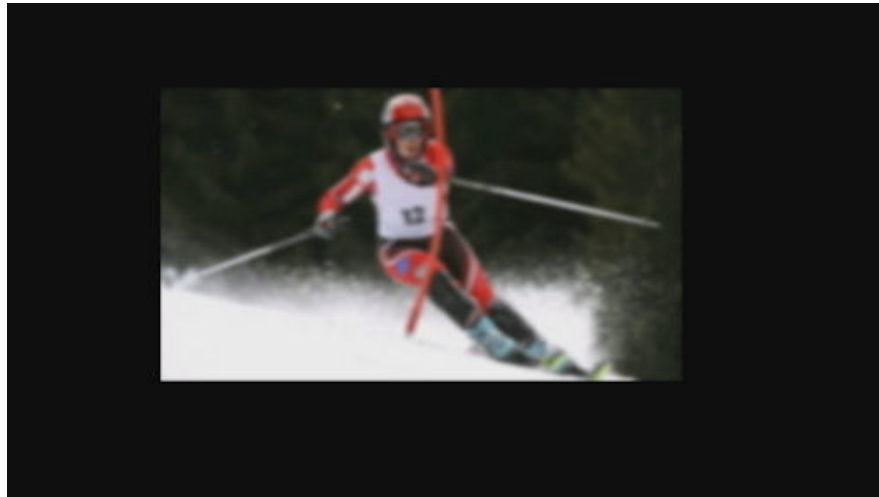
Surface with Defocus applied

Pixelation
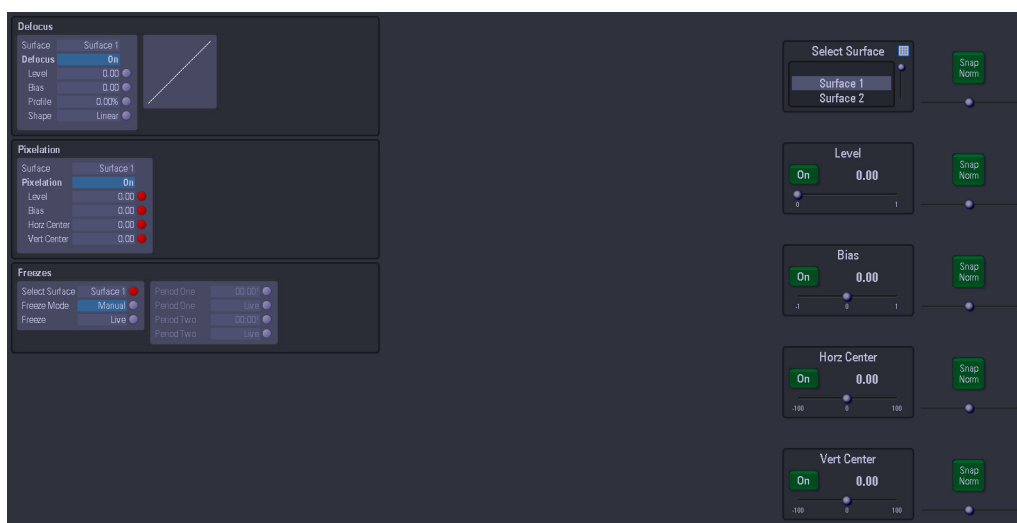
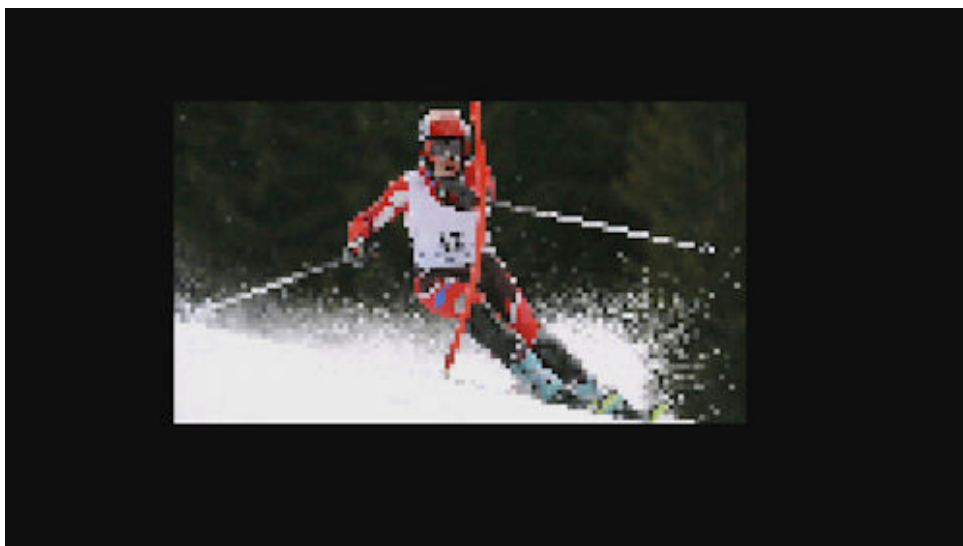**Surface** - the selected surface that Pixelation will be applied to.

Pixelation - On/Off

Pixelation Level - The level of Pixelation applied to a source

Pixelation Bias - Adjusts the aspect ratio of the pixels

Horz Center - Changes the Pixelation center on the x-axis
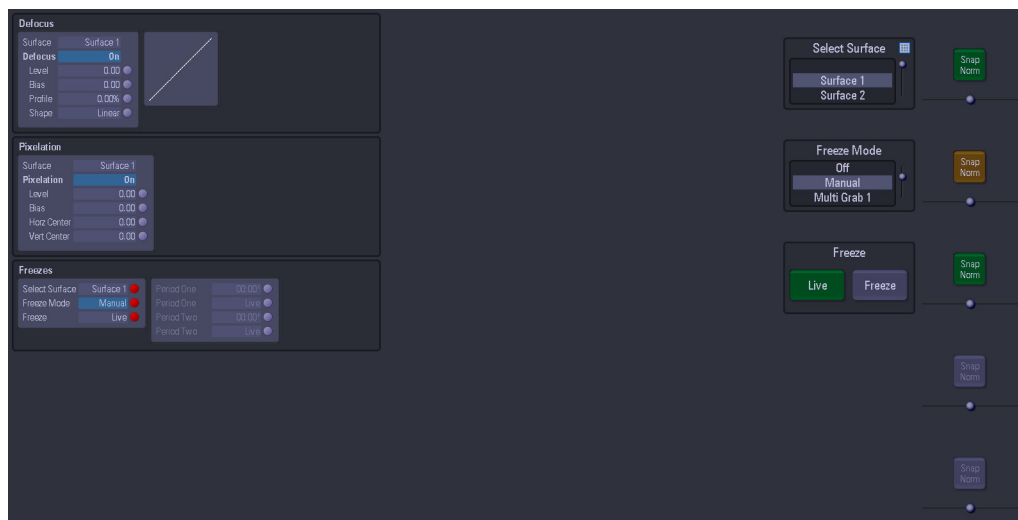
Vert Center - Changes the Pixelation center on the y-axis
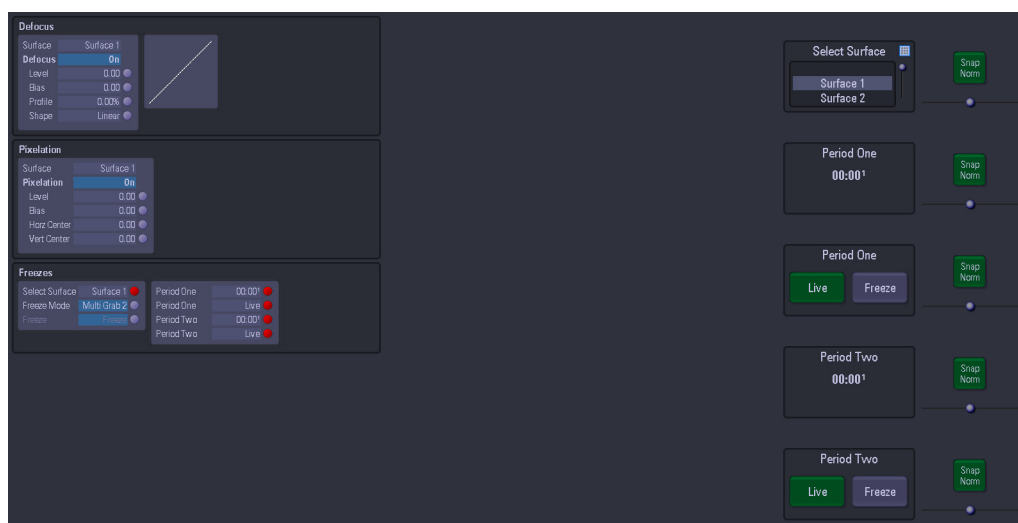

Surface with Pixelation applied

Freeze

This function is used to freeze a video source that has been applied to a DVE tile or model.

Freeze Mode - turns freeze mode On/Off and selects between the following actions:

Manual - this allows the user to manually freeze the video source using the **{Live} {Freeze}** buttons.

Multi Grab 1 - in this mode a freeze of a pre-determined duration can be applied, this will freeze the video source for the set period of frames or time, whilst the video is still playing.

Multigrab 2 - this will set a second pre determined duration and will freeze the video after Multi Grab 1 has finished its freeze.

**Freeze** - selects between Live (video playing) or Freeze (video frozen)

Period One - at the next Field 1,2 or Frame as determined, the live video will be frozen for the specified duration

Period Two -- this determines the duration of the second period of the freeze

DVE Surface - Per-Surface Lighting

The DVE Per-Surface Lighting option provides a source of Light or Shade, which can be directed permanently at a surface or directed into a 3D space through which a surface can pass.

Lighting can be used on DVE Models and on DVE Tiles. A DVE Tile will be used as an example in explaining the Lighting menus.
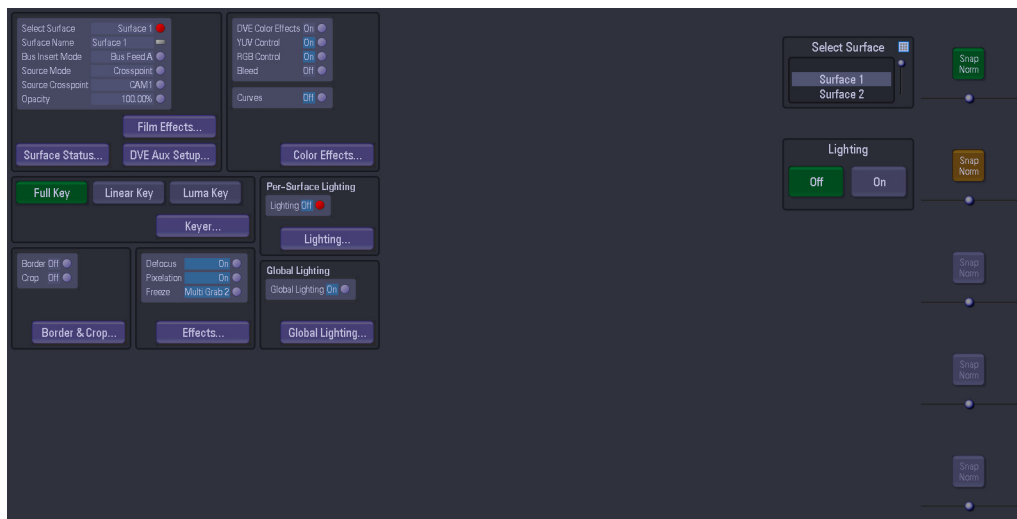
Press the **{Lighting...}** button to enter the Lighting 1 menu. The default menu allows the use to have all the main high level parameter adjustment to quickly change the basic lighting levels. This includes the **Light Intensity**, **Diffuse Level** (adjusts the amount of reflection) and the **Specular Level** (the white spot that appears on an object when a light is shone on its surface). Adjustments can also be made to the position of the light source and the direction that the beam of light shines.
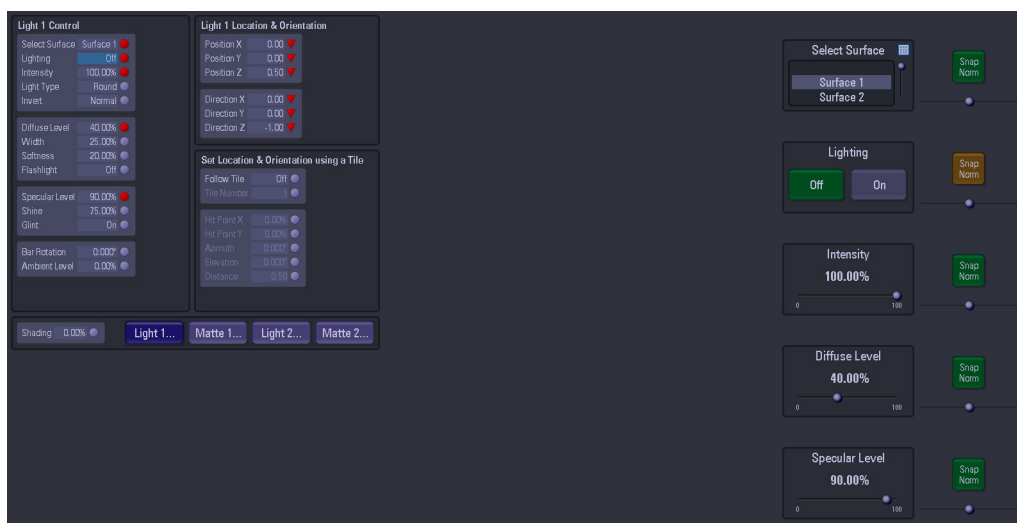
Parameter Controls

The picture above is the default light setting, the light source is in the center of the picture shown on a DVE Tile.

Select Surface - this is the surface if the tile of the DVE that the user is working on, care needs to be taken that the correct surface is being selected before any adjustments are made.

Lighting - this turns the Lighting function On/Off

Intensity - controls the overall lighting effect. 100% is the default setting, as the parameter is wound down to 0% the light source starts to disappear.

Light Type - this changes the type of light source, select either Round or Bar light source.

Invert - will invert the source on the tile making the tile intensely white with just the surface showing where the light source was.

Diffuse Level - will change the intensity of the diffused light

Width - will change the width of the diffused light. Try turning the Softness parameter down to 0%, this will display the outer edge of the diffused light. Then adjusting the width towards 100% will move the outer edge beyond the limits of the monitor.

Softness - will change the softness of the diffused light from the outer edge inwards, 0% will display a hard edge.

Flashlight - as the name depicts, this will simulate a flashlight light source

Specular Level and **Shine** - these control the glossy or specular element of the lighting.

Shine - controls the size of specular highlights created, 100% being a high gloss surface.

Glint mode adds a specular highlight that flashes across a tile, an example would be to swinging a flashlight across a surface in the dark.

Bar Rotation - this will rotate a bar light around 360 degrees

Ambient Level - this controls the 'room' lighting, flooding the whole tile with light.

Light 1 Location and Orientation:

Position X,Y,Z - sets the location of the light source around the DVE Surface coordinates

Direction X,Y,Z - sets the vector direction that the light is pointing in.

Set Location & Orientation using a Tile

This allows the user to move the light source for individual tiles. The menu also allows the user to specify where on a tile the light will hit, at what angle and from what distance. The light 'Location and Orientation' is then automatically setup by the software.

Follow Tile - switches the "Follow" function On/Off

Tile Number - selects the tile

Hit Point X, Hit Point Y - specifies where the 'line of sight' of the light will hit the tile. 100% represents the width of a tile.

Azimuth & Elevation - this is the angle that the light hits the tile. Elevation is how 'upright' this angle is and azimuth is the 'around' direction.
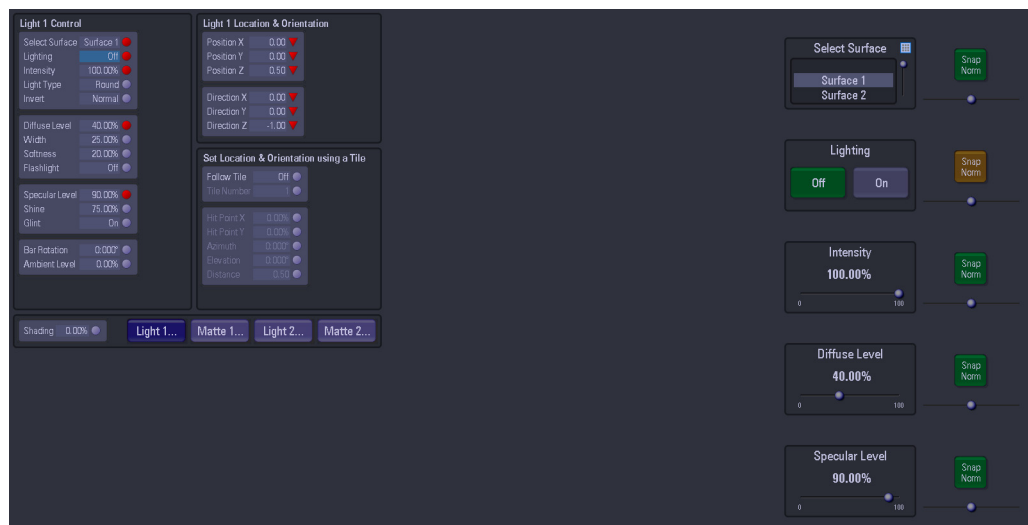
Distance - how far, along the 'line of sight' direction, is the light away from the tile.

Shading - this allows areas of the tile that are not illuminated to be darkened.

Global Lighting

Global lighting will apply a lighting affect to all DVE Tiles at the same time or lighting to a selected Model. This is a menu link to the **DVE Model - Global Light**

Light Control

This menu can add two individual light sources to the DVE Tiles or Models, Light 1 adds one light source and obviously Light 2 adds the second.
The two light sources can be moved completely independently of each other and the color of the light source can be changed using the Matte 1 and Matte 2 parameter controls.

> Note: To save repeating information, the information below will describe using Light 1 parameters to control the light source, light 2 has exactly the same controls

DVE Tiles 1 to 4 with Global Lighting applied (Bar Light Effect)

Lighting - this turns the Lighting function On/Off

Intensity - controls the overall lighting effect. 100% is the default setting, as the parameter is wound down to 0% the light source starts to disappear.

Light Type - this changes the type of light source, select either Round or Bar light source.

Invert - will invert the source on the tile making the tile intensely white with just the surface showing where the light source was.

Diffuse Level - will change the intensity of the diffused light

Width - will change the width of the diffused light. Try turning the Softness parameter down to 0%, this will display the outer edge of the diffused light. Then adjusting the width towards 100% will move the outer edge beyond the limits of the monitor.

Softness - will change the softness of the diffused light from the outer edge inwards, 0% will display a hard edge.

Flashlight - as the name depicts, this will simulate a flashlight light source

Specular Level and **Shine** - these control the glossy or specular element of the lighting.
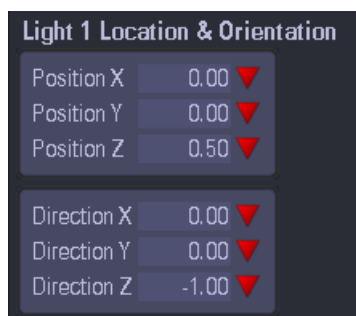
Shine - controls the size of specular highlights created, 100% being a high gloss surface.

Glint mode adds a specular highlight that flashes across a tile, an example would be to swinging a flashlight across a surface in the dark.

Bar Rotation - this will rotate a bar light around 360 degrees

Ambient Level - this controls the 'room' lighting, flooding the whole tile with light.

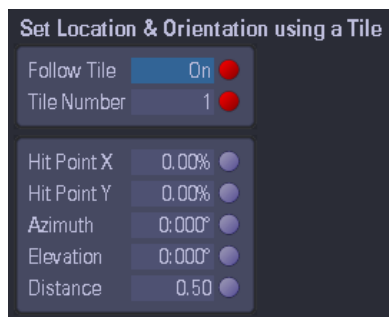**Light 1 Location and Orientation:**

Position X,Y,Z - sets the location of the light source around the DVE Surface coordinates

Direction X,Y,Z - sets the vector direction that the light is pointing in.

Set Location & Orientation using a Tile

This allows the user to move the light source for individual tiles. The menu also allows the user to specify where on a tile the light will hit, at what angle and from what distance. The light 'Location and Orientation' is then automatically setup by the software.
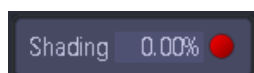

Follow Tile - switches the "Follow" function On/Off

Tile Number - selects the tile

Hit Point X, Hit Point Y - specifies where the 'line of sight' of the light will hit the tile. 100% represents the width of a tile.
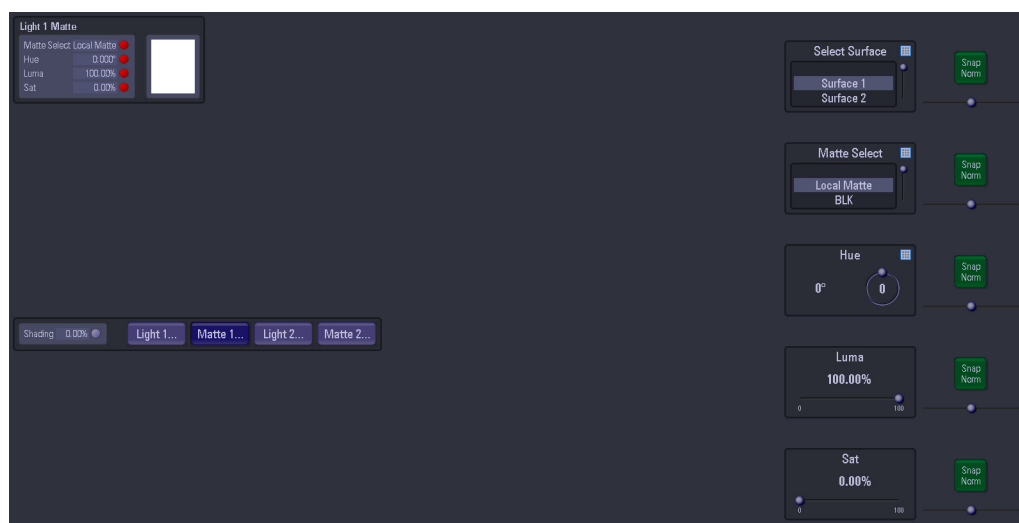
Azimuth & Elevation - this is the angle that the light hits the tile. Elevation is how 'upright' this angle is and azimuth is the 'around' direction.

Distance - how far, along the 'line of sight' direction, is the light away from the tile.

Shading - this allows areas of the tile that are not illuminated to be darkened.
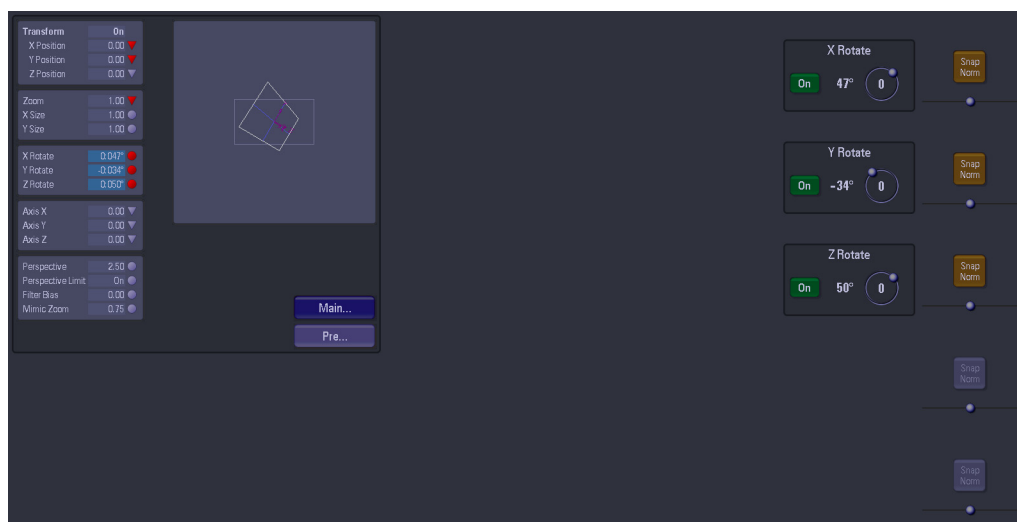
Light Matte 1:

Matte Select - sets the color of the light source, allowing the user to set a defined color for the light source.

Local Matte - allows the light color to be adjusted using the Hue, Luma and Sat parameters.

DVE Transform (XFORM)

This menu allows a Source and Target transform to be applied to a DVE model.

Main - (global) moves the model around as determined by the parameter controls in the attachers.

Pre - (local) moves the model around as determined by the parameter controls in the attachers

> Note: The parameter controls for both Main and Pre are exactly the same, the difference being the way they move the DVE Tile or Model around.

X, Y, Z Position - will move the position of the tile around the central point

Zoom - will zoom in on the model

X, Y Size - will change the physical shape of the tile horizontally or vertically

X Rotate - rotates the tile such that the left or right sides turn into the screen

Y Rotate - rotates the top or bottom into the screen

Z Rotate - rotates the tile clockwise/counter-clockwise

Axis X, Y, Z - moves the central axis point around

Source Transform

As an example of using the X-FORM Source and Target Transform these diagrams show a moving DVE model, moving within a larger plane. To create this effect it is necessary to apply two separate transforms. In this diagram the Two Tile Model has been used to construct a cross-shape. A spin modulation was then applied to the Source X Rotate by turning the model about the Y-axis. The spinning cross is then Y Rotated by the Source transform.
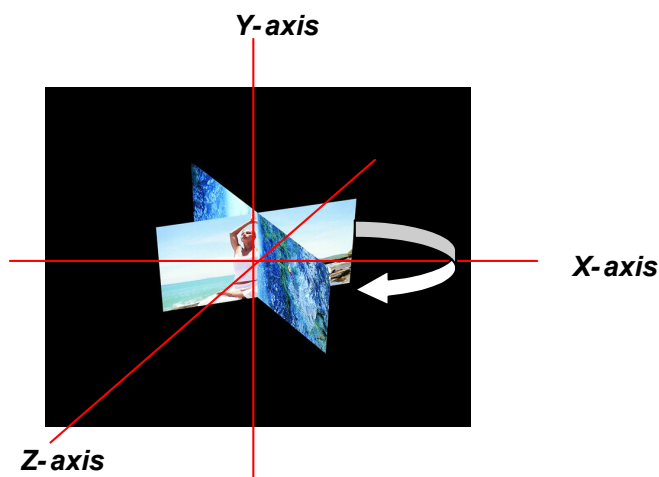

Target Transform

In this diagram the model and the space in which it was positioned by the Source transform, have had their X and Z-positions globally modulated by the Target transform. A single sine modulator was used for this, where there was a 90 degrees offset applied to the X-position. This created a circular motion.

The final result shows two transforms operating in series; the Source transform causing the cross shape to turn about its own axis (marked in red), while the Target transform is causing it to orbit about the Target axis (marked in blue), while facing the viewer.
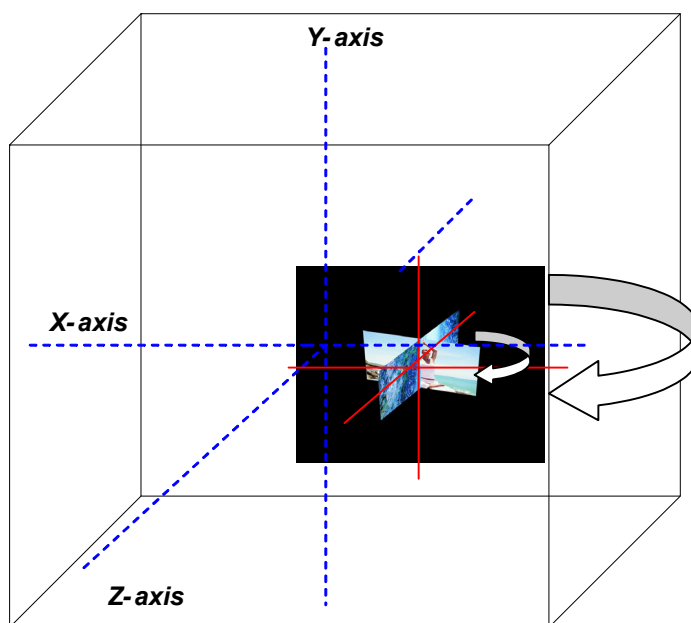
DVE Preset Transitions

This menu gives the user an option to select from a list of preset DVE models to use in a transition.
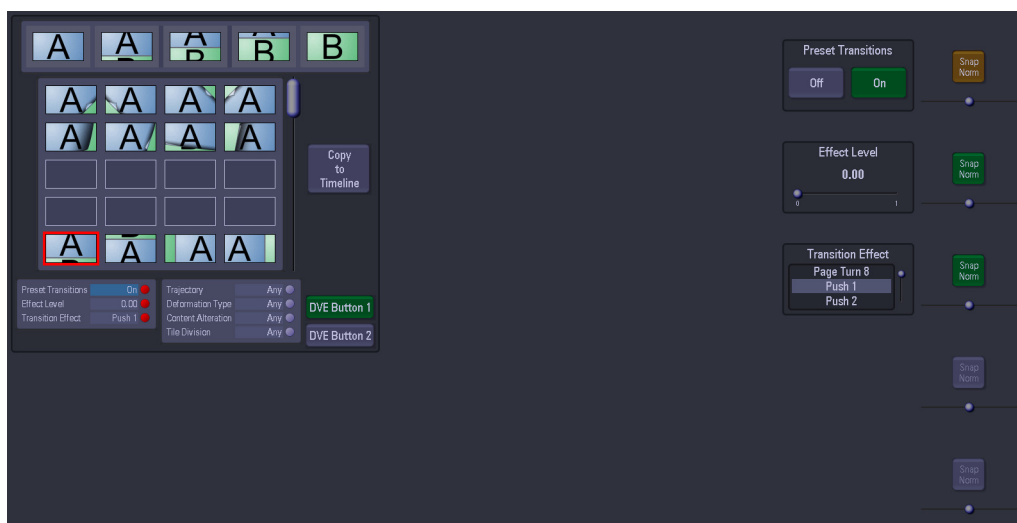
Presets Transitions - turns the option On/Off

Effect Level - turning this parameter control will start the current DVE Trans and run through to the transition finish

Transition Effect - selects a transition effect from the options in the menu.

The Transition Presets feature is a quick way of using a DVE transition on a background. The transition icons (at the bottom) illustrate the choices of transition available and the film strip icons (at the top) illustrate how the transition will take shape.

Make sure that enough DVE channels have been allocated to DVE 1 in the **User Config - DVE Trans Setup** menu.
To use, enter the DVE Trans menu on the GUI and switch **Preset Transitions {On}**.
Select, from the list of effects, the desired transition model.
To preview as a Background transition, select **[PVW TRANS]** in the **Transition Control** area on the Control Surface, and turn on **{Bgnd 3D DVE1}** and move the TBar from 0% through to 100%. When satisfied with the effect press Pvw Trans again in the Transition Control area, to switch it off and use the TBar or Auto Trans to complete the transition live to air.
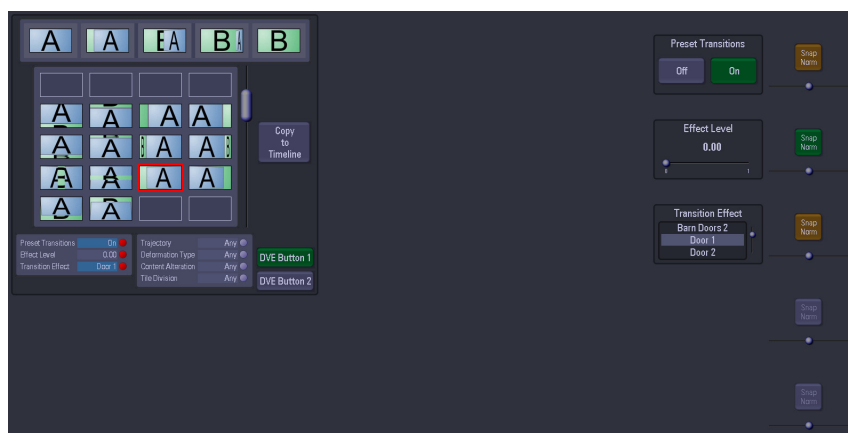
DVE Preset Trans - Barn Doors effect

Copy to Timeline - this will copy the current DVE Transition into a timeline that is being created.
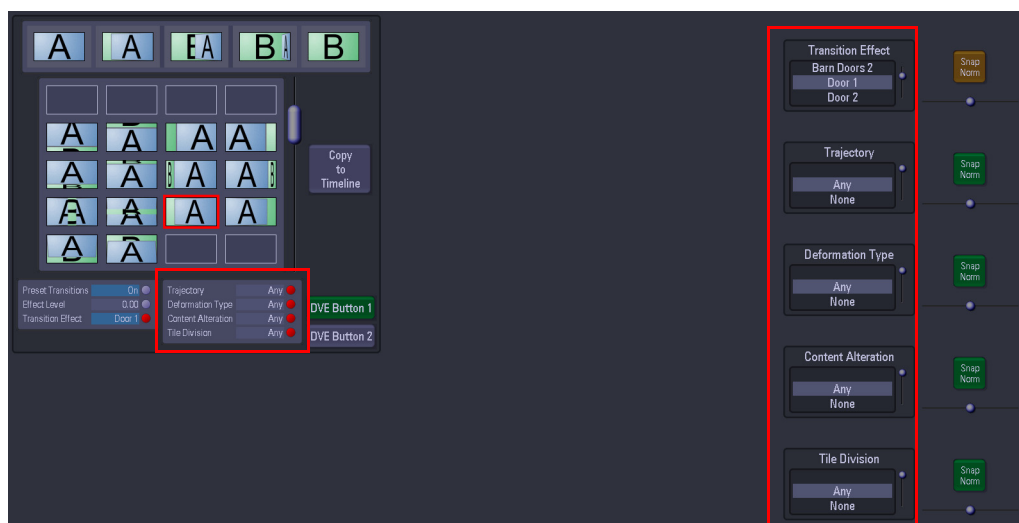
Parameter Controls

> Note: Not all the parameters below will work with all the preset DVE models, for example, Tile Division parameter will work with the Fragmentation model but not Page Turn.

Trajectory - selects the movement of the DVE Model whilst in a transition. Selecting one of the Trajectories automatically selects the available Transition Effect, for example; a Horizontal Trajectory is applied to a Push 1 type Transition Effect, a Diagonal Trajectory is applied to a Page Turn Transition Effect.

Deformation Type - selects the way the DVE Model is deformed. Selecting one of the Deformations automatically selects the available Transition Effect for example; Curl is applied to a Page Turn.

Content Alteration - changes the physical appearance of a DVE Model, such as Pixelate and Defocus.

Tile Division - sets the way a DVE Tile divides during a transition, example; Half, splits the tile in to two pieces, Quarter, splits the tile into four etc.

DVE Preset Trans - Page Turn

Grass Valley Technical Support

For technical assistance, contact our international support center, at
1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An online form for e-mail contact is also available from the website.

Corporate Head Office

Grass Valley
3499 Douglas-B.-Floreani
St-Laurent, Quebec H4S 2C6
Canada
Telephone: +1 514 333 1772
Fax: +1 514 333 9828
www.grassvalley.com